APPENDIX A

RECORD OF DECISION

RECORD OF DECISION

Nepera Chemical Company Superfund Site

Orange County, New York

United States Environmental Protection Agency
Region 2
New York, New York

September 2007

DECLARATION

SITE NAME AND LOCATION

Nepera Chemical Company Superfund Site
Hamptonburgh, Orange County, New York
Superfund Identification Number: NY000511451

STATEMENT OF BASIS AND PURPOSE

This decision document presents the Selected Remedy for the Nepera Superfund Site (hereinafter the Site) located in Hamptonburgh, Orange County, New York. The Selected Remedy was chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP).

This decision is based on the Administrative Record for this Site, which has been developed in accordance with Section 113(k) of CERCLA, 42 United States Code Section 9613(k). This Administrative Record file is available for review at the Hamptonburgh Town Hall in Campbell Hall, New York and at the United States Environmental Protection Agency Region 2 Superfund Records Center at 290 Broadway, New York, NY. The Administrative Record Index (Appendix III) identifies each of the items comprising the Administrative Record upon which the selection of the Remedial Action is based. The State of New York (State) concurs with the Selected Remedy.

ASSESSMENT OF THE SITE

The response action selected in this Record of Decision (ROD) is necessary to protect public health or welfare or the environment from actual or threatened releases of hazardous substances from the Site into the environment.

DESCRIPTION OF THE SELECTED REMEDY

The EPA will address the Site contamination as one operable unit. The selected remedy involves remediation of two site-specific media, namely, soil and groundwater. The remediation of contaminated soil involves excavating the soils within the former lagoons and treatment of these soils utilizing soil vapor extraction and biological degradation within an engineered, below-grade biocell (e.g., bioremedial reactor). The remediation of groundwater involves introducing an oxygenating compound to create aerobic conditions and, thereby, enhance biodegradation within the excavation below the natural overburden water table.

The selected remedy includes the following components:

- Excavation of Contaminated Soils: Site soils, which exceed New York State Department of Environmental Conservation (NYSDEC) soil cleanup objectives, within the former lagoons will be excavated and placed into a biocell;
- Treatment of Soils in the Biocell: Soils within the biocell will be treated using soil vapor extraction and biological degradation technologies to reach target cleanup levels. The biocell will operate as a dual-technology system utilizing SVE and biological degradation within an engineered below-grade biocell. Excavated soils will be treated to reach target cleanup levels;
- Backfilling of Excavated Areas: The excavated areas of the Site, which are not utilized in the construction of the biocell will be backfilled to grade, using clean fill meeting NYSDEC soil cleanup objectives;
- Bioremediation of Contaminants of Concern (COCs) in Site Groundwater: Bioremediation will be accomplished by enhancement of the indigenous microbial population through the introduction of oxygenating compounds into targeted areas of the groundwater aquifer. Bioremediation (oxygenating compounds) technology would be applied as an initial enhancement within the excavated area of the former lagoons;
- Long-term Groundwater Monitoring Program: A long-term groundwater monitoring program will be implemented to verify that the concentrations and the extent of the groundwater contaminants are declining. Results of the long-term groundwater monitoring will be used to evaluate the effectiveness of the remedy and to assess the need for additional injections/applications of oxygenating compounds. This program will also include the continued sampling of those private wells in the vicinity of the Site which are currently monitored;

- Institutional Controls: To protect human health from exposure to the existing contamination while cleanup is ongoing, this alternative includes institutional controls, which include an environmental easement/restrictive covenant, which will be filed in the property records of Orange County. The environmental easement/restrictive covenant will, at a minimum require: (a) restricting excavation or other activities that would interfere with constructed remedies (with the exception of Alternative S6 - Excavation and Off-Site Disposal), unless the excavation or other activities are in compliance with an EPA-approved site management plan; (b) restricting new construction at the Site unless an evaluation of the potential for vapor intrusion is conducted and mitigation, if necessary, is performed in compliance with an EPA-approved SMP and (c) restricting the use of groundwater as a source of potable or process water unless groundwater quality standards are met;
- Site Management Plan: A SMP will be developed to address soil and groundwater at the Site and would provide for the proper management of all Site remedy components post-construction, including the institutional controls discussed above, and will also include: (a) monitoring of Site groundwater to ensure that, following remedy implementation, the groundwater quality improves; (b) provision for any operation and maintenance required of the components of the remedy; and (c) periodic certifications by the owner/operator or other person implementing the remedy that any institutional and engineering controls are in place;
- Engineering Controls: Engineering controls consisting of fencing and posting signs will be implemented to prevent inadvertent exposure to Site contaminants by the local populace;
- Contingency Plan: In the event that monitoring should indicate that the Village of Maybrook public water supply wells have been impacted by the Site-related contaminants above health-based levels, a contingency plan would be necessary to provide for a wellhead treatment for the Village of Maybrook wells on an interim basis pending further consideration of groundwater treatment alternatives to meet groundwater treatment standards; and
- Five-Year Review: Hazardous substances will remain at this Site above levels that would not allow for unlimited use and unrestricted exposure for at least five years.

Pursuant to Section 121(c) of CERCLA, EPA will review site remedies no less often than every five years. The first five-year review is due within five years of the date that construction is initiated for the remedial action. The current expectation is that construction will be initiated during the year 2010 and the first five-year review will be due in the year 2015.

DECLARATION OF STATUTORY DETERMINATIONS

Statutory Requirements

The Selected Remedy attains the mandates of CERCLA Section 121, and the regulatory requirements of the NCP. The Selected Remedy is protective of human health and the environment, complies with Federal and State requirements that are applicable or relevant and appropriate to the remedial action, is cost-effective, and utilizes permanent solutions and alternative treatment or resource recovery technologies to the maximum extent practicable.

Statutory Preference for Treatment

The Selected Remedy satisfies the statutory preference for treatment as a principal element of the remedy (i.e., reduce the toxicity, mobility, or volume of hazardous substances through treatment). Remedial actions at the source area and in the water table are expected to remove site-related contaminants and eliminate the threat of further migration of the contaminants in the groundwater.

Five-Year Review Requirements

Hazardous substances will remain at this Site above levels that would allow for unlimited use and unrestricted exposure for at least five years. Pursuant to Section 121(c) of CERCLA, EPA will review site remedies no less often than every five years.

ROD DATA CERTIFICATION CHECKLIST

The following information is included in the Decision Summary section of this Record of Decision. Additional information can be found in the Administrative Record file for the Site, the index of which can be found in Appendix III of this document.

- Contaminants of concern and their respective concentrations (See ROD, pages 6,7,8 and Appendix II Table A)
- Baseline risk represented by the chemicals of concern (see ROD page 10 and Appendix II Tables A - F)
- Remediation goals (e.g., Cleanup levels) established for chemicals of concern and the basis for these levels (see ROD, page 19)
- A discussion of source materials constituting principal threats may be found in the "Principal Threat Waste" section. (see ROD, page 39)
- Current and reasonably-anticipated future land use assumptions and current and potential future beneficial uses of groundwater used in the baseline risk assessment and ROD (see ROD, page 9)
- Expected land and groundwater use that will be available at the Site as a result of the selected remedy (see ROD, page 41)
- Estimated capital, annual operation and maintenance, and total present-worth costs, and the number of years over which the remedy cost estimates are projected (see ROD, pages 35 and 39, and Appendix VI)
- Key factors that led to selecting the remedy (i.e., how the Selected Remedy provides the best balance of tradeoffs with respect to the balancing and modifying criteria, emphasizing criteria key to the decision) may be found in the "Comparative Analysis of Alternatives" and "Statutory Determinations" sections. (see ROD, pages 31 through 39, and page 45)

_______________________________ 9/28/07
George Pavlou Date
Director,
Emergency and Remedial Response Division
USEPA Region 2

VI

RECORD OF DECISION FACT SHEET
EPA REGION 2

Site

Site name: Nepera Chemical Company Site

Site location: Hamptonburgh, Orange County, New York

Listed on the NPL: June 1, 1986

Record of Decision

Date signed: September 28, 2007

Selected remedy:

Soil: Excavation and treatment of the soils in a below-grade biocell utilizing soil vapor extraction and biodegradation.

Groundwater: Groundwater in the overburden will be treated through application of an oxygenating compound, which will flow radially outward from the former lagoon area and also downward to enhance biodegradation of groundwater in both the overburden aquifer and the bedrock aquifer.

Capital cost:	$2,570,000
Operation and Maintenance and Monitoring costs:	$512,700
Total Present-worth cost:	$3,815,000

Lead: EPA

Primary Contact: Mark Dannenberg, Remedial Project Manager, (212) 637-4251

Secondary Contact: Angela Carpenter, Chief, Eastern New York Remediation Section, (212) 637-4263

Main PRPs: Nepera, Inc., Cambrex Corp., Warner Lambert Company, Pfizer, Inc.

Waste

Waste type:	Volatile organic and semi-volatile organic compounds, including pyridine-related compounds
Waste origin:	Chemical processing wastewater from the Nepera, Inc. facility in Harriman, New York
Contaminated media:	Soil, groundwater

RECORD OF DECISION

DECISION SUMMARY

Nepera Chemical Company Superfund Site

Hamptonburgh, Orange County, New York

United States Environmental Protection Agency
Region 2
New York, New York

September 2007

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APPENDICES

SITE NAME, LOCATION, AND DESCRIPTION

The Nepera Chemical Company Site (Site) includes a 29-acre property located on County Highway 4 in Hamptonburgh, Orange County, New York (hereinafter, the Nepera Property), and all contamination emanating from the Nepera Property (see Appendix I, Figure 1). The Site property is bounded on the north by Orange County Highway 4, Beaverdam Brook to the west, the Otter Kill to the south, and an undeveloped tract of land to the east. Three residences exist in the immediate vicinity of the Site, one just west of the southwest marsh area, and two to the north and northeast of the Site on the opposite side of Orange County Highway 4.

The Nepera Property is owned by Nepera, Inc. Wastewaters from chemical production processes conducted at the Nepera plant facility located in Harriman, New York, were trucked to the Site and discharged into lagoons on the Nepera Property. The lagoons, comprising an area of approximately five (5) acres, were constructed within the Nepera Property.

Approximately 6,500 people live within three miles of the Nepera Property. The closest residences are located approximately 250 feet, 175 feet and 450 feet to the west, north and northeast, respectively. These residences rely on private supply wells for their drinking water. The vicinity near the Nepera Property is residential and agricultural in nature. The public water supply wells for the Village of Maybrook are located approximately 800 feet to the east-northeast of the Nepera Property.

The Site is situated in the Valley and Ridge province of the Appalachian Region in Orange County, New York. In general, the topography of the area is typified by relatively low-lying ridges and valleys. The Site is located within a 4.5 square mile watershed consisting of Beaverdam Brook and its tributaries, which discharge to the Otter Kill located approximately 500 feet to the south of the Nepera Property. The geologic units at the site are divided into two primary units, the overburden (comprised of topsoil, fill, and gravel) and the bedrock (comprised predominantly of shale). Ground surface topography is generally bedrock controlled in that the ground surface generally follows the bedrock surface topography. The overburden thickness at the site is also related to bedrock topography in that it is generally thinner (or absent) over bedrock ridges, while greater overburden thicknesses have been deposited in bedrock depressions and valleys. The overburden ranges in thickness from 0 to 20 feet.

Most of the Site is forested. The former lagoon area, which was stripped of vegetation while in use, is now covered with grasses, wild flowers, and mixed brush. There are two aquifers that exist beneath the Site, the overburden aquifer and the bedrock aquifer. The overburden aquifer is the surficial unit which overlies the bedrock aquifer. The bedrock aquifer is the primary source for public water in the area. No significant layers of impeding clays were observed between the two aquifers within the study area. An east to west trending groundwater divide is present in the bedrock aquifer underlying (and transecting) the lagoon area. As such, groundwater flow has a northerly and a southerly component radiating from this divide.

Both aquifers have been impacted by Site-related contamination. The unconsolidated deposits that form the overburden are generally thin (e.g., 5 to 20 feet). The overburden overlies the harder and denser bedrock, which is comprised of compressed shale and sandstone. The shale bedrock has a high degree of fracturing and the bedrock aquifer provides a significant portion of the groundwater for domestic uses in the area.

SITE HISTORY AND ENFORCEMENT ACTIVITIES

The Nepera Chemical Company was a producer of bulk pharmaceutical chemicals, hydrogels, and pyridine-based industrial chemical intermediate compounds at its facility, located in Harriman, New York, approximately 25 miles away from the Site.

The Nepera Property was purchased by the Nepera Chemical Company in 1952. The Nepera Chemical Company itself was purchased by Warner Lambert Corporation in 1956 and reincorporated as Nepera, Inc. From 1953 through 1967, Nepera used the lagoons at the Site for the discharge of industrial wastewater generated at its plant in Harriman (see Appendix I, Figure 3). No wastewater disposal has taken place at the Site since December 1967. All of the lagoons were back-filled with clean soil by 1974.

Beginning in 1967, numerous investigations were conducted by various consultants to Nepera to determine the extent of contamination at the Site. Based on the results of these investigations, NYSDEC placed the Site on the New York Registry of Inactive Hazardous Waste Disposal Sites. On August 17, 1984, the State of New York entered into a Consent Decree with Nepera to conduct a remedial investigation to determine the type and extent of contamination at the Site.

On June 1, 1986, EPA placed the Site on the National Priorities List (NPL) of sites under CERCLA. EPA subsequently designated the New York State Department of Environmental Conservation (NYSDEC) as the lead regulatory agency for overseeing the implementation of a Remedial Investigation and Feasibility Study (RI/FS) at the Site.

Beginning in 1988, under an NYSDEC-issued order, Nepera, Inc. hired a contractor to conduct an investigation to determine the nature and extent of the contamination at and emanating from the Site. The investigation of groundwater was expanded in 1993, and, again, in 2001 with the installation of additional groundwater monitoring wells. Subsequent groundwater monitoring was conducted in 2001 and 2002. Extensive additional soil sampling activities were conducted in 2002 and a wetland delineation survey was conducted in 2003. The phased approach to the RI was iterative in nature, where the results of each task were used to focus the scope of each subsequent task.

During the several phases of the RI, a total of 38 monitoring wells were installed in the study area (see Appendix I, Figure 2). The first draft RI Report was submitted in March, 1996. NYSDEC and EPA determined that further work was necessary to define the type and extent of soil contamination at the site and to determine the downgradient extent of the groundwater contamination plume which emanated from the Site. In March, 2005, an updated draft RI Report was submitted to NYSDEC and EPA. This document was further revised and an approved Final RI Report was submitted on June 16, 2006.

NYSDEC and EPA agreed that EPA would be designated as the lead agency for the Nepera Site at the conclusion of the RI/FS process.

COMMUNITY PARTICIPATION

The Proposed Plan and supporting documentation for the Nepera Site were made available to the public on July 31, 2007 at the EPA Region 2 Administrative Record File Room in New York, NY, and at the Hamptonburgh Town Office in Campbell Hall, New York. EPA issued a public notice in the Times Herald-Record on July 31, 2007, which contained information relevant to the duration of the public comment period, the date of the public meeting, and the availability of the Proposed Plan and the Administrative Record. The public comment period was held from July 31, 2007 through August 29, 2007. This notice was sent to all addresses on the mailing list. In addition, a public meeting was held on August 16, 2007, at the Hamptonburgh Town Office, 18 Bull Road, Campbell Hall, NY. The purpose of the meeting was to inform interested citizens and local officials about the Superfund process, to discuss the Proposed Plan, to receive comments on the Proposed Plan, and to respond to questions from area residents and other interested parties. The comments and questions received at the public meeting and in writing throughout the public comment period, as well as EPA's responses to those comments and questions, are included as part of this Record of Decision in the Responsiveness Summary (Appendix V).

SCOPE AND ROLE OF RESPONSE ACTION

This Record of Decision addresses the remediation of the contaminated soil and contaminated groundwater related to the Site. The entire Site is addressed as one operable unit. The Site-specific media impacted at the Site are soils (in the former lagoon area) and groundwater. The two main objectives for response action at this Site are to remediate contaminated soil, which continues to act as a source of groundwater contamination, and to treat groundwater so that the Contaminants of Concern (COCs) are below Maximum Contaminant Levels (MCLs), established pursuant to the Safe Drinking Water Act, 42 U.S.C. §300f et.seq., thereby making the Site suitable for residential use. The planned Remedial Action is a final action for the Site and is expected to successfully achieve the Remedial Action Objectives (RAOs). The EPA has selected a combination of technologies to address the contamination in the two media. By using a combination of different treatment technologies, this response will permanently reduce the toxicity, mobility, and volume of source materials at the Site and restore groundwater to meet ARARs/MCLs.

SITE CHARACTERISTICS

This section of the ROD provides an overview of the Site's geology and hydrogeology; the sampling strategy used at the Site; the conceptual Site model (CSM); and the nature and extent of contamination at the Site. Further detailed information about the Site's characteristics can be found in the RI Report.

Overview of the Site

The Town of Hamptonburgh is located in the northern part of Orange County, New York, in the Poughkeepsie-Newburgh metropolitan area. Its population was 4,686, based on the 2000 census. The latitude of the Town of Hamptonburgh is 41.450N and the longitude is 74.253W.

The Nepera Site is in an area of rolling hill topography. Two hills, and a portion of a third, occupy the Site with a maximum local relief of approximately 40 feet. Most of the Site is forested. The Site is bordered on the west by Beaverdam Brook, and on the south and southeast by Otter Kill and wetlands.

The area where the Site is located is zoned residential/agricultural. Residences in the immediate vicinity of the Site are located to the west, north, and northeast of the Nepera Property.

Geology/Hydrogeology

The Site is situated in the valley and ridge province of the Appalachian Region in Orange County, New York. In general, the topography of the area is typified by relatively low-lying ridges and valleys. There are two aquifers that exist beneath the Site, the overburden aquifer and the bedrock aquifer. Both aquifers have been impacted by Site-related contamination. The unconsolidated deposits that form the overburden are generally thin (e.g., 5 to 20 feet). The overburden overlies the harder, denser bedrock consisting of compressed shale and sandstone. The shale bedrock has a high degree of fracturing and the bedrock aquifer provides a significant portion of the groundwater for domestic uses in the area.

Ecology

The Nepera Site is in an area of rolling hill topography. Two hills, and a portion of a third, occupy the Site with a maximum local relief of approximately 40 feet. Most of the Site is forested. The former lagoon area, which was stripped of vegetation while in use, is now covered with grasses, wild flowers, and mixed brush. The Site is bordered on the west by Beaverdam Brook, and on the south and southeast by Otter Kill and wetlands.

Cultural Resources

A Cultural Resources Survey was performed for the Site and indicated that there were neither any significant National Register of Historic Places or National Register of Historic Places-eligible properties nor any likely prehistoric resources within the project boundaries. As such, the regulatory requirements relating to the identification and protection of historic properties/places have been addressed and no additional archaeological investigations are considered necessary at the Site.

Nature and Extent of Contamination

Activities performed as part of the RI included: on-site soil borings, soil sampling, monitoring well drilling and installation, groundwater sampling, and residential well sampling. These activities were performed by the potentially responsible parties (PRPs) with EPA and NYSDEC oversight. Site-related contamination was found in soil and groundwater. The results of the RI are summarized below.

Soil: RI soil sampling activities were conducted in phases. Sampling performed in 1991 and 1996 identified contamination in the lagoon area and determined the lagoon area to be the primary source of the contaminants in the groundwater plume. The primary contaminants identified during soil sampling activities include benzene (maximum concentration of 13 milligrams per kilogram (mg/kg)), chlorobenzene (maximum concentration of 12 mg/kg), ethylbenzene (maximum concentration of 22 mg/kg), toluene (maximum concentration of 52 mg/kg), xylenes (maximum concentration of 300 mg/kg) and pyridine-related compounds (maximum concentration of 74 mg/kg of 2-amino pyridine). All of these contaminants are deemed to be COCs for the Site. In addition, several samples detected elevated levels of metals, including mercury and manganese. An additional 120 soil samples were collected from the lagoon area in 2003 to evaluate levels of metals. Soil samples were also collected from locations not impacted by the Site to determine Site-specific background levels for metals. Analytical data from the 2003 sampling activities indicated that the concentration levels of metals in the lagoon area were comparable to background concentrations and, as such, metals are not considered to be COCs. The presence of mercury in earlier samples (from 1991 and 1995) was of additional concern as the form of mercury (e.g., organo-mercury or inorganic mercury) can significantly change its toxicity. As such, additional analyses were performed on selected samples collected in 2003 to determine the form (or species) of mercury present in Site soils. These analyses determined that over 99% of the mercury present in Site soils is in the form of inorganic mercury, which is significantly less toxic than organo-mercury.

As stated earlier, the former lagoons are within an area approximately 5 acres in size, but the total area of the six lagoons is estimated to be 128,850 square feet (approximately 3 acres). The volume of contaminated soil was calculated based on the actual surface area of each lagoon, the average depth of the overburden within each lagoon (down to bedrock), the thickness of a distinct black-stained layer observed during the completion of test pits, and the clean fill that was put in the lagoons when they were closed. The average overburden thickness was estimated to range from 3.4 (for Lagoon 6) to 13.3 feet (for Lagoon 3). The total volume of contaminated soil is estimated to be 30,086 cubic yards. Furthermore, it is estimated that 20% (approximately 6,000 cubic yards) of this is comprised of shale and cobble which will be sorted out prior to implementation of a soil remedy. Therefore, the remedial alternatives assessed in the Proposed Plan were based on a total volume of contaminated soil of 24,086 cubic yards, which is equivalent to approximately 38,700 tons.

Groundwater: The groundwater monitoring program included sampling of groundwater monitoring wells located at (and bordering) the Site and analyses of these samples for organic and inorganic compounds. These efforts were comprised of several separate field mobilizations conducted between 1995 and 2003. The investigation was conducted in an iterative manner, where the results of each task were used to develop the scope of each subsequent task. The RI included:

- Installing permanent groundwater monitoring wells to act as fixed monitoring and/or compliance points within both the overburden aquifer and the bedrock aquifer. A total of 38 groundwater monitoring wells were installed in the study area.
- Collecting a series of groundwater samples from the assembled monitoring network;
- Identifying the Contaminants of Potential Concern in both aquifers; and
- Characterizing the horizontal and vertical extent of site-related contaminants in the overburden and bedrock aquifers and determining the extent of the groundwater contaminant plume.

As with the contaminated soil, the primary contaminants identified in groundwater include benzene, chlorobenzene, ethylbenzene, toluene, xylenes and pyridine-related compounds. These contaminants were detected above MCLs in the wells located within the property boundary.

Residences in the vicinity of the Site rely on private wells for their potable water supply. As a precautionary measure, to ensure that these wells are not impacted by the Site, private wells in the immediate vicinity of the Site have routinely been sampled for Site-related contaminants. With the exception of minor levels of Site-related contaminants detected below drinking water standards (e.g., MCLs) in May 2002 and September 2003, sampling data indicate non-detectable levels of Site-related contaminants in private wells. Also, because of their close proximity to the Site (approximately 800 feet), the public wells located on County Highway 4, which are used to supply drinking water to customers served by the Village of Maybrook, are monitored on a quarterly basis for Site-related contaminants and must comply with the New York State Department of Health drinking water standards. Site-related contaminants have not been detected in the Village of Maybrook Public Wells.

Sediment: As stated earlier, the Site is bounded by Beaverdam Brook to the west and the Otter Kill to the south. Since the hydrogeological link between groundwater and these water bodies was not clear, sediment samples were collected in 1985, 1991, and 1995 from Beaverdam Brook and the Otter Kill.

The EPA performed additional sediment sampling from the bed of Beaverdam Brook in 2003. Groundwater flow direction was considered in determining sampling location points. Samples were collected from a total of 27 sampling locations, upstream, downstream, and adjacent to the Site, and were analyzed for volatile organic compounds and semi-volatile organic compounds (including Site-related COCs). Site-related COCs were not detected in these samples.

Contaminant Fate and Transport

Migration of contaminants at the Nepera Site occurs from contaminated soils to the groundwater. Migration of dissolved contaminants also occurs within the groundwater aquifers. The site-related Volatile Organic Compounds (VOCs) and Semi-Volatile Organic Compounds (SVOCs) emanate from the former lagoon area which, itself, still acts as an ongoing source of groundwater contamination and migration to both the overburden and bedrock aquifers. Groundwater contamination has generally been confined within the site property boundary.

CURRENT AND POTENTIAL FUTURE SITE AND RESOURCE USES

The Site is in an area used for residential and/or agricultural purposes. The zoning of the Site (residential/agricultural) is not expected to change in the near future.

The groundwater at the Site is classified by NYSDEC as GA, which is groundwater suitable as a source of drinking water. There is a future potential beneficial use of groundwater at the Site as a drinking water source. Residences in the vicinity of the Site rely on private wells for their potable water supply. In addition, public water supply wells of the Village of Maybrook are located approximately 800 feet east-northeast of the property boundary.

SUMMARY OF SITE RISKS

As part of the RI/FS, EPA conducted a baseline risk assessment to estimate the current and future effects of contaminants on human health and the environment. A baseline risk assessment is an analysis of the potential adverse human health and ecological effects of releases of hazardous substances from a site in the absence of any actions or controls to mitigate such releases, under current and future land uses. The baseline risk assessment includes a human health risk assessment and an ecological risk assessment. It provides the basis for taking action and identifies the contaminants and exposure pathways that need to be addressed by the remedial action. This section of the ROD summarizes the results of the baseline risk assessments for this Site.

Human Health Risk Assessment

A four-step process is utilized for assessing site-related human health risks for a reasonable maximum exposure scenario: Hazard Identification - uses the analytical data collected to identify the contaminants of potential concern at the Site for each medium, with consideration of a number of factors explained below; Exposure Assessment - estimates the magnitude of actual and/or potential human exposures, the frequency and duration of these exposures, and the pathways (e.g., ingesting contaminated well-water) by which humans are potentially exposed; Toxicity Assessment - determines the types of adverse health effects associated with chemical exposures, and the relationship between magnitude of exposure (dose) and severity of adverse effects (response); and Risk Characterization - summarizes and combines outputs of the exposure and toxicity assessments to provide a quantitative assessment of Site-related risks. The risk characterization also identifies contamination with concentrations which exceed acceptable levels, defined by the National Contingency Plan (NCP) as an excess lifetime cancer risk greater than 1×10^{-6} - 1×10^{-4} or a Hazard Index greater than 1.0; contaminants at these concentrations are considered chemical of concern (COCs) and are typically those that will require remedial action at the Site. This section also includes a discussion of the uncertainties associated with these risks.

Hazard Identification: In this step, the chemicals of potential concern (COPCs) at the Site in each medium were identified based on such factors as toxicity, frequency of occurrence, fate and transport of the contaminants in the environment, concentration, mobility, persistence, and bioaccumulation. Analytical information that was collected to determine the nature and extent of contamination revealed the presence of a number of constituents, such as benzene, xylenes, aniline, and 2-aminopyridine in groundwater and benzene, toluene, chlorobenzene, xylenes, and 2-aminopyridine in soils at concentrations of potential concern. Based on this information, the risk assessment focused on groundwater and soils and the contaminants which may pose significant risk to human health. A comprehensive list of all COPCs can be found in the baseline human health risk assessment (BHHRA) in the administrative record. Only the COCs, or those chemicals requiring remediation at the Site, are listed in Appendix II, Table A. The COCs for groundwater at the Site are benzene, xylenes, aniline, and 2-aminopyridine, and the COCs for soils at the Site are benzene, toluene, chlorobenzene, xylenes, and 2-aminopyridine.

Exposure Assessment: Consistent with Superfund policy and guidance, the BHHRA is a baseline human health risk assessment and therefore assumes no remediation or institutional controls to mitigate or remove hazardous substance releases. Cancer risks and noncancer hazard indices were calculated based on an estimate of the reasonable maximum exposure (RME) expected to occur under current and future conditions at the Site. The RME is defined as the highest exposure that is reasonably expected to occur at a site. For those contaminants for which the risk or hazard exceeded acceptable levels, the central tendency estimate (CTE), or the average exposure, was also evaluated.

Current Site land use is zoned agricultural/residential. The neighboring properties are primarily residential in nature. Future land use is expected to remain the same, or be developed as a recreational area. Groundwater is designated by the State as a potable water supply, meaning it could be used for drinking in the future. Therefore, potential exposure to groundwater as a drinking water source was evaluated. The BHHRA evaluated potential risks to populations associated with both current and potential future land uses. Exposure pathways were identified for each potentially exposed population and each potential exposure scenario for the groundwater and soils at the Site. Exposure pathways assessed in the BHHRA for the groundwater included ingestion of and dermal contact with tap water. Inhalation of volatile contaminants while showering and bathing was also evaluated for the hypothetical future resident. Exposure pathways evaluated for the soils included construction workers exposed to soils from excavation or other construction activities that might disturb soil. Based on current and anticipated future use of the Site, the BHHRA considered a variety of possible receptors, including the future Site construction worker and the potential future on-site resident (adult and child). A summary of the exposure pathways included in the baseline human health risk assessments can be found in Appendix II, Table B.

Typically, exposures are evaluated using a statistical estimate of the exposure point concentration (EPC), which is usually an upperbound estimate of the average concentration for each contaminant, but in some cases may be the maximum detected concentration. A summary of the exposure point concentrations for the COCs in groundwater can be found in Appendix II, Table A, while a comprehensive list of the exposure point concentrations for all COPCs can be found in the BHHRA.

Toxicity Assessment: Under current EPA guidelines, the likelihood of carcinogenic risks and noncancer hazards due to exposure to Site chemicals are considered separately. Consistent with current EPA policy, it was assumed that the toxic effects of the Site-related chemicals would be additive. Thus, cancer and noncancer risks associated with exposures to individual COPCs were summed to indicate the potential risks and hazards associated with mixtures of potential carcinogens and noncarcinogens, respectively.

Toxicity data for the human health risk assessment were provided by the Integrated Risk Information System (IRIS) database or other sources that are identified as appropriate references for toxicity values consistent with EPA's directive on toxicity values. This information is presented in Appendix II, Table C (noncancer toxicity data summary) and Appendix II, Table D (cancer toxicity data summary).

Risk Characterization: Noncarcinogenic (systemic) risks were assessed using a hazard index (HI) approach, based on a comparison of expected contaminant intakes and benchmark comparison levels of intake (reference doses [RfDs], reference concentrations [RfCs]). RfDs and RfCs are estimates of daily exposure levels for humans (including sensitive individuals) which are thought to be safe over a lifetime of exposure. The estimated intake of chemicals identified in environmental media (e.g., the amount of a chemical in soil incidentally ingested) is compared to the RfD or the RfC to derive the hazard quotient (HQ) for the contaminant in the particular medium. The HI is obtained by adding the hazard quotients for all compounds within a particular medium that impact a particular receptor population.

The HQs for oral and dermal exposures are calculated as below. The HQ for inhalation exposures is calculated using a similar model that incorporates the RfC rather than the RfD.

HQ = Intake/RfD

Where: HQ = hazard quotient
Intake = estimated intake for a chemical (mg/kg-day)
RfD = reference dose (mg/kg-day)

The intake and the RfD represent the same exposure period (i.e., chronic, subchronic, or acute).

As previously stated, the HI is calculated by summing the HQs for all chemicals for likely exposure scenarios for a specific population. An HI greater than 1.0 indicates that the potential exists for noncarcinogenic health effects to occur as a result of Site-related exposures, with the potential for health effects increasing as the HI increases. When the HI calculated for all chemicals for a specific population exceeds 1.0, separate HI values are then calculated for those chemicals which are known to act on the same target organ. These discrete HI values are then compared to the acceptable limit of 1.0 to evaluate the potential for noncancer health effects on a specific target organ. The HI provides a useful reference point for gauging the potential significance of multiple contaminant exposures within a single medium or across media. A summary of the noncarcinogenic risks associated with these chemicals for each exposure pathway is contained in Appendix II, Table E.

As seen in Appendix II, Table E, noncancer hazard for the potential future site resident (child and adult) who may be exposed to groundwater as a drinking water is 620, and the noncancer hazard for the potential future construction worker who may be exposed to soils is 120. Therefore, noncarcinogenic hazards may occur from exposure routes evaluated in the risk assessment. The noncarcinogenic hazards were attributable primarily to exposure to benzene, xylenes, aniline, and 2-aminopyridine in groundwater and to benzene, toluene, chlorobenzene, xylenes, and 2-aminopyridine in soils.

For carcinogens, risks are generally expressed as the incremental probability of an individual developing cancer over a lifetime as a result of exposure to a carcinogen, using the cancer slope factor (SF) for oral and dermal exposures and the inhalation unit risk (IUR) for inhalation exposures. Excess lifetime cancer risk for oral and dermal exposures is calculated from the following equation, while the equation for inhalation exposures uses the IUR, rather than the SF:

Risk = LADD x SF

Where: Risk = excess lifetime cancer risk, a unitless probability (1×10^{-6}) of an individual developing cancer
LADD = lifetime average daily dose averaged over 70 years (mg/kg-day)
SF = cancer slope factor, expressed as [1/(mg/kg-day)]

These risks are probabilities that are usually expressed in scientific notation (such as 1×10^{-4}). An excess lifetime cancer risk of 1×10^{-4} indicates that one additional incidence of cancer may occur in a population of 10,000 people who are exposed under the conditions identified in the assessment. As stated in the NCP, the acceptable risk range for Site-related exposure is 10^{-6} to 10^{-4}.

As shown in BHHRA and summarized in Appendix II, Table F, in the event that untreated Site groundwater were to be used as drinking water, exposure to groundwater contaminated with benzene would be associated with an excess lifetime cancer risk of 1×10^{-3} for the potential future on-site resident (child and adult). Exposure to soils by potential future construction workers would be associated with an excess lifetime cancer risk of 1×10^{-4}.

These cancer risks and noncancer health hazards indicate that there is significant potential risk from direct exposure to soils and groundwater to potentially exposed populations. For these receptors, exposure to benzene in soils and groundwater results in both an excess lifetime cancer risk that exceeds EPA's target risk range of 10^{-4} to 10^{-6}, while exposure to benzene, xylenes, aniline, toluene, chlorobenzene, and 2-aminopyridine results in an HI above the threshold of 1. The concentration of benzene is also in excess of the Federal and State MCL of 5 µg/L.

Ecological Risk Assessment

A baseline ecological risk assessment (BERA) was prepared to identify the potential environmental risks associated with surface water, groundwater, sediment, and soil. The results of the BERA suggested that there are contaminants in groundwater, soils, and sediment, but they are not present at levels posing significant risks to ecological receptors. The potential for risk to ecological receptors exposed to site-related contaminants was limited to isolated locations, primarily in Lagoon 6, and the risk associated with this area used the conservative assumption that the ecological receptors (e.g., soil invertebrates, mammalian insectivores, and carnivores) spend 100% of their lives in the area of Lagoon 6. The contaminants that were identified in the BERA (outside of Lagoon 6) were determined not to pose a potential for adverse ecological effects because they were common elements of soil that were not related to Site operations, they were detected at concentrations lower than background levels, they were infrequently detected, or they were detected at concentrations indicating that the HQs were only slightly above 1 with no adverse impacts to exposed receptors expected. A detailed presentation of these data can be found in the RI Report.

Uncertainties

The procedures and inputs used to assess risks in this evaluation, as in all such assessments, are subject to a wide variety of uncertainties. In general, the main sources of uncertainty include:

- Environmental chemistry sampling and analysis;
- environmental parameter measurement;
- fate and transport modeling;
- exposure parameter estimation; and
- toxicological data.

Uncertainty in environmental sampling arises in part from the potentially uneven distribution of chemicals in the media sampled. Consequently, there is significant uncertainty as to the actual levels present. Environmental chemistry-analysis error can stem from several sources including the errors inherent in the analytical methods and characteristics of the matrix being sampled.

Uncertainties in the exposure assessment are related to estimates of how often an individual would actually come in contact with the chemicals of concern, the period of time over which such exposure would occur, and the characteristics of the models used to estimate the concentrations of the chemicals of concern at the point of exposure.

Uncertainties in toxicological data occur in extrapolating both from animals to humans and from high to low doses of exposure, as well as from the difficulties in assessing the toxicity of a mixture of chemicals. These uncertainties are addressed by making conservative assumptions concerning risk and exposure parameters throughout the assessment. As a result, the risk assessment provides upper-bound estimates of the risks to populations near the Site, and is highly unlikely to underestimate actual risks related to the Site.

More specific information concerning public health risks, including a quantitative evaluation of the degree of risk associated with various exposure pathways, is presented in the BHHRA report.

Basis for Remedial Action

The response actions selected in this ROD are necessary to protect the public health or welfare or the environment from actual releases of hazardous substances in the environment. The response actions are warranted because:

1. Exposure to contaminated soil poses risks to human health;

2. The contaminated soil continues to be a source of groundwater contamination. As such, a remedial action is warranted to reduce contamination in the soil to levels below cleanup objectives;

3. Groundwater COCs are present in concentrations both above MCLs and that pose a significant potential risk from direct exposure to potentially exposed populations. As such, a remedial action is warranted to restore the contaminated groundwater for future use.

REMEDIAL ACTION OBJECTIVES

Remedial Action Objectives (RAOs) provide general descriptions of what the Superfund cleanup is designed to accomplish. The RAOs are established on the basis of the nature and extent of the contamination, the resources that are currently and potentially threatened, and the potential for human and environmental exposure. Remedial action goals are media-specific goals to protect human health and the environment and are based on available information and standards such as applicable or relevant and appropriate requirements (ARARs), to-be-considered (TBC) guidance, and risk-based levels established in the risk assessment. Section 121(d) of CERCLA requires that, at a minimum, any remedial action implemented at a site achieve overall protection of human health and the environment and comply with all ARARs. ARARs at a site may include other federal and state environmental statutes and regulations.

The general RAOs identified for the Site are to:

1. prevent exposure of human receptors to contaminated soils and contaminated groundwater;

2. minimize migration of contaminants from soils to groundwater;

3. restore the aquifer(s) to beneficial use;

4. ensure that hazardous constituents within the soil and groundwater meet acceptable levels consistent with reasonably anticipated future use; and

5. minimize potential human contact with waste constituents.

Implementing active remedies in the source area and in the groundwater aquifers will address the risks associated with the site-related contaminants. Specifically, implementation of the remedies is expected to reduce the concentration of contaminants in soils below soil cleanup objectives and reduce the concentrations of contaminants in groundwater to drinking water standards. To meet these remedial action objectives the following cleanup objectives have been selected based on federal and state promulgated ARARs, risk-based levels, background concentrations, and guidance values.

Cleanup Objectives

Contaminant	Groundwater (ug/L) *	Soils (ug/kg)
Benzene	1	60 ***
Chlorobenzene	5	1,100 ***
Ethylbenzene	5	1,000 ***
Toluene	5	700 ***
Xylenes	5	1,600 ***
2-amino pyridine	1	400 ****
Pyridine	50	400 ****
Alpha picoline	50	575 ****
Acetone	50	50 ***
Aniline	5	1,510 ****
Pyridine-related tentatively identified compounds	50	400 ****

* Groundwater cleanup levels for organic COCs are based on the more conservative of the Federal Maximum Contaminant Levels (MCLs) and the New York Ambient Groundwater Standards and Guidance Values (NYSDEC TOGs 1.1.1, June 1998).
*** The values shown are from *NYSDEC Subpart 375: Remedial Program Soil Cleanup Objectives.*
**** The values shown were derived by NYSDEC based on the *Division Technical and Administrative Guidance Memorandum: Determination of Soil Cleanup Objectives and Cleanup Levels, Division of Hazardous Waste Remediation, January 24, 1994.*

DESCRIPTION OF ALTERNATIVES

CERCLA § 121(b)(1), 42 U.S.C. § 9621(b)(1), requires that each selected site remedy be protective of human health and the environment, be cost-effective, comply with other statutory laws, and utilize permanent solutions and alternative treatment technologies and resource recovery alternatives to the maximum extent practicable. In addition, the statute includes a preference for the use of treatment as a principal element for the reduction of toxicity, mobility, or volume of the hazardous substances.

A number of alternatives were evaluated to address soil and groundwater contamination. These alternatives are described below.

Common Element for All Alternatives

All alternatives would include institutional controls. Specifically, an environmental easement/restrictive covenant would be filed in the property records of Orange County. The easement/covenant would, at a minimum, require: (a) restricting excavation or other activities that would interfere with constructed remedies (with the exception of Alternative S6 - Excavation and Off-Site Disposal), unless the excavation or other activities are in compliance with an EPA-approved site management plan; (b) restricting new construction at the Site unless an evaluation of the potential for vapor intrusion is conducted and mitigation, if necessary, is performed in compliance with an EPA-approved site management plan; and (c) restricting the use of groundwater as a source of potable or process water unless groundwater quality standards are met.

A Site Management Plan would also be developed to address soil and groundwater at the Site and would provide for the proper management of all Site remedy components post-construction, including the institutional controls discussed above, and will also include: (a) monitoring of Site groundwater to ensure that, following remedy implementation, the groundwater quality improves; (b) provision for any operation and maintenance required of the components of the remedy; and (c) periodic certifications by the owner/operator or other person implementing the remedy that any institutional and engineering controls are in place.

In addition, physical controls, such as regular maintenance of the perimeter fence, would be implemented to restrict Site access and thereby prevent potential exposure to chemicals present in the soils in the vicinity of the former lagoons.

All groundwater remedial alternatives would include the requirement that those private wells, in the vicinity of the Site currently being monitored in relation to this Site, will continue to be monitored on an ongoing basis. The frequency of the residential well sampling will be determined during Remedial Design.

In addition, in the event that monitoring should indicate that the Village of Maybrook public water supply wells have been impacted by the Site-related contaminants above health-based levels, a contingency plan is necessary to provide for a wellhead treatment for the Village of Maybrook wells on an interim basis pending further consideration of groundwater treatment alternatives to meet groundwater treatment standards.

Soil Alternatives:

The following alternatives were evaluated for the remediation of soils:

S1: No Further Action
The "No Action" alternative is considered in accordance with NCP requirements and provides a baseline for comparison with other alternatives. If this alternative were implemented, the current status of the sjuite would remain unchanged. Institutional controls would not be implemented to restrict future site development or use. Engineering controls would not be implemented to prevent site access or exposure to site contaminants. Although existing security fencing at the site would remain, it would not be monitored or maintained under this alternative.

Capital Cost	$ 0
O & M Cost	$ 0
Present Worth Cost	$ 0
Construction Time	N/A

S2: Institutional Controls with Limited Actions
This alternative is comprised of the institutional controls mentioned previously. Physical controls would also be used to eliminate the future potential for on-Site exposures. A perimeter security fence (with appropriate warning signs) has

been constructed to restrict Site access and thereby prevents the potential exposure to chemicals present in the surface soils in the vicinity of the former lagoons. The Site security fencing and warning signs would be routinely inspected and maintained at the Site to restrict access to the Site.

This Alternative would not achieve the Remedial Action Objectives. Institutional controls, as described in this alternative, will be retained as components of other remedial alternatives.

Capital Cost	$12,600
O & M Cost	$13,550
Present Worth Cost	$217,000
Construction Time	3 months

S3: Installation of a Cap over the Contaminated Soils

Under this alternative, a cap would be constructed over the area where contaminated soils exceed the NYSDEC Soil Cleanup Objectives. This area corresponds to that of the former lagoons.

The objectives of this alternative are to:

- minimize infiltration and thereby reduce leaching of chemicals from the soils to the groundwater. This would result in a reduction of chemical concentrations in the overburden and bedrock aquifers;

- eliminate the potential for dermal contact by chemicals associated with surface and subsurface soils;

- minimize volatilization of chemicals in the near surface soils to the atmosphere; and

- minimize the potential transport of chemicals in surface water runoff by eliminating surface water runoff contact with chemicals in the surface soils.

Two capping options were considered in the Feasibility Study for this Site, namely, a Resource Conservation and Recovery Act (RCRA) cap and a clay cap meeting NYSDEC standards for a sanitary landfill. Both of these options would achieve the objectives, but the RCRA cap would be more effective in reducing leachate generation. As such, the RCRA cap is the option considered here.

Chemicals in the soils above the water table would be contained by a cap. The cap would serve to inhibit infiltration of precipitation and thereby reduce leaching of chemicals from the soils to groundwater, resulting in reduced chemical concentrations in the overburden and bedrock groundwater over time. Furthermore, the decreased infiltration over the former lagoon area would result in a lowering of the water table in the overburden aquifer directly beneath the Site resulting in further reductions of the chemical migration from this area via groundwater transport.

Capital Cost	\$2,290,000
O & M Cost	\$24,000
Present Worth Cost	\$2,647,000
Construction Time	8 months

S4: Excavation and On-Site Soil Vapor Extraction and Biocell
This alternative would involve the excavation of the soils within the former lagoons, placement of the soils into a biocell, and treatment of these soils with concentrations of COCs exceeding the NYSDEC Soil Cleanup Objectives. Specifically, the biocell will operate as a dual-technology system utilizing soil vapor extraction (SVE) and biological degradation within an engineered below-grade biocell. Excavated soils would be treated to reach target cleanup levels.

The soils would be treated within the biocell by installing perforated pipes within multiple layers of the biocell. The perforated pipes would be connected to a blower unit to draw air through the piles; contaminants would be volatilized into this air. The air would be treated, if necessary, using carbon adsorption, prior to being recirculated or exhausted to the atmosphere. In addition, nutrients would be added to the treatment layers as required to enhance biological degradation.

In general, the biocell would be operated in two primary modes: SVE mode (high air flow rate); and bioremediation mode (low air flow rate).

During the SVE mode, the system would be operated at higher air flow rates which would be selected to optimize the removal of the VOCs constituents using SVE. After the removal rate of the VOCs decreases to an asymptotic or nominal rate, the system would be switched over to the bioremediation mode. During the bioremediation mode, the system would be operated at an optimized air flow rate selected to sustain the aerobic biodegradation of the remaining VOCs and SVOCs.

Capital Cost	$2,388,000
O & M Cost	$406,000
Present Worth Cost	$3,119,000
Construction Time	2 years

S5: In-Situ Soil Vapor Extraction

This alternative involves the installation of an in-situ soil vapor extraction system (ISVE) in the area identified for potential soil remediation. A drainage swale would be constructed along the edge of the treatment area to prevent surface water flow from entering the treatment area.

The soil vapor extraction wells would be strategically placed within the area of soil to be treated to ensure that airflow within the area is maximized. The extraction wells would consist of a screened section of pipe (or pipes) placed in permeable packing with the top few feet of the well grouted to prevent the short circuiting of airflow from the surface. An impermeable temporary cap would be placed over the treatment area to minimize infiltration of precipitation, lower the water table and increase the volume of the unsaturated zone, and prevent short circuiting of airflow directly from the surface.

The extraction wells would be installed with vacuum and positive pressures being applied at alternating well locations to create an induced pressure gradient to move the vapors through the soil. Extracted vapors would be treated utilizing carbon filters, if required, prior to being reinjected or exhausted to the atmosphere. Vapor-phase nutrients would also be injected into the soils, if needed, to enhance biodegradation.

Capital Cost	$1,211,000
O & M Cost	$460,900
Present Worth Cost	$2,302,000
Construction Time	4 years

S6: Excavation and Off-Site Disposal
Alternative S6 involves the excavation of soils within the former lagoons containing COCs at concentrations exceeding NYSDEC Soil Cleanup Objectives. The excavated soils would be disposed of off-Site at an appropriate landfill.

The capital cost associated with Alternative S6, as reported in the FS Report, has a significant range because it is not known exactly how much of the contaminated soil would be classified as hazardous waste which is more expensive to handle and dispose than conventional solid waste. The capital cost cited in the table below represents the high end of the range. The capital cost associated with the low end of the range is $5,736,000.

Alternative S6 would include the following major components:

- pre-design investigation;
- excavation of on-site soils exceeding soil cleanup objectives for the COCs;
- post excavation sampling to verify achievement of soil cleanup objectives;

- disposal of excavated soils at appropriate off-site facility (or facilities); and
- backfilling of excavated areas with clean fill.

Capital Cost	$11,208,000
O & M Cost	$22,000
Present Worth Cost	$11,228,000
Construction Time	1 year

Groundwater Alternatives

The following alternatives were evaluated for the remediation of groundwater.

GW-1: No Further Action
The Superfund program requires that a "No Action" alternative be considered as a baseline for comparison with the other alternatives.

Under this alternative (alternative GW-1 in the FS), EPA would take no further action at the Site to prevent exposure to groundwater contamination. The No Action alternative was retained for comparison purposes as required by the NCP. This alternative would only be considered in this evaluation as a baseline to compare other alternatives. No remedial actions would be implemented as part of this alternative. Groundwater would continue to migrate and contamination would continue to attenuate through dilution. This alternative does not include institutional controls or long-term groundwater monitoring.

Because this alternative would result in contaminants remaining on-Site above levels that would allow for unlimited use and unrestricted exposure, CERCLA requires that the Site be reviewed at least once every five years.

Capital Cost	$ 0
O & M Cost	$ 0
Present Worth Cost	$ 0
Construction Time	N/A

GW-2: Enhanced Bioremediation with Long-Term Groundwater Monitoring

This alternative involves the manipulation of Site groundwater conditions to enhance in-situ bioremediation of the COCs by the indigenous microbial population. The design details for enhanced bioremediation would be established following the removal of the source area soils. The site-related COCs are susceptible to degradation in aerobic conditions. The excavated area will be treated with oxygenating compounds to create an aerobic environment and, thereby, stimulate biodegradation within the area of elevated groundwater contamination. Multiple applications of the oxygenating compounds may be necessary. This will be followed by a long-term groundwater monitoring program where groundwater samples would be collected and analyzed regularly in order to verify that the concentrations and the extent of groundwater contaminants are declining. The exact frequency and parameters of sampling and location of any additional monitoring wells would be determined during the design phase. To enhance aerobic biodegradation outside of the source area, the remedial design would consider the controlled, location-specific injection(s) of oxygenating compounds into the groundwater contamination plume(s) at various locations to stimulate biodegradation of COCs. Multiple injections over time may also be necessary for this action to be fully effective.

The groundwater monitoring program would be conducted to ensure that this remedy was protective, that the concentrations of COCs were attenuating, and to evaluate the rates of biodegradation/bioremediation (in both the bedrock and overburden aquifers).

The oxygen additive would be applied into the areas of the contaminant plume where the contamination is highest.

Capital Cost	$182,000
O & M Cost	$106,700
Present Worth Cost	$696,000
Construction Time	6 months

GW-3: Groundwater Extraction and Treatment
Under this alternative, an overburden and bedrock groundwater collection system would be installed downgradient of each area with identified soil and groundwater concentrations above the potential cleanup levels. The components of this alternative include the installation of several strategically located bedrock groundwater extraction wells and a water table tile collection system installed in two areas of the overburden (downgradient of the source area to capture both the north and south components of the groundwater flow from the source area). The collection systems would be designed to minimize the migration of contaminants in groundwater and to restore the aquifer(s) to beneficial use. The bedrock extraction wells would pipe contaminated groundwater to a groundwater treatment system for treatment; the tile collection system would route contaminated groundwater in the overburden to the groundwater treatment system for treatment. This alternative would prevent the potential migration of chemicals off Site via groundwater transport. The collected groundwater would be treated via a carbon adsorption system located along the western edge of the Site to meet discharge standards as well as water quality requirements for discharge to Beaverdam Brook.

An ongoing groundwater monitoring program would be conducted to ensure that this remedy was protective.

Capital Cost	$1,656,000
O & M Cost	$229,000
Present Worth cost	$3,339,000
Construction Time	10 months

GW-4: Enhanced Bioremediation

This alternative involves the manipulation of Site groundwater conditions to enhance in-situ bioremediation of the COCs by the indigenous microbial population. The design details for enhanced bioremediation would be established following the treatment/removal of the source area soils. Treatment would involve either the controlled injection of oxygenating compounds (e.g., Oxygen Releasing Compounds (ORCs)) to enhance biodegradation of the COCs or the controlled injection of a chemical oxidizer (e.g., hydrogen peroxide) and nutrients into the groundwater contamination plumes to chemically convert the organic contamination into nonhazardous compounds. The preliminary design assumes that 440 injection points would be required for the injection of ORC into the overburden groundwater. The area would encompass both the source area and locations downgradient of the source area, including both the north and south components of the groundwater flow. Multiple injections over time may be necessary for this action to be fully effective.

An ongoing groundwater monitoring program would be conducted to ensure that this remedy was protective, that the concentrations of COCs were attenuating, and to evaluate the rates of biodegradation/bioremediation (in both the bedrock and overburden aquifers).

Capital Cost	$332,000
O & M Cost	$106,700
Present Worth Cost	$846,000
Construction Time	10 months

GW-5: Biosparging

Under this alternative, pressurized gas (i.e., oxygen) would be injected into the groundwater at very low flowrates to enhance bioremediation. Specifically, the biosparging technology considered here is "in-situ Submerged Oxygen Curtain" (iSOC). This technology injects supersaturated oxygen into the groundwater such that oxygen is infused into groundwater without the formation of bubbles. This prevents vapors (e.g., the bubbles) from entering the vadose zone. The vadose zone is that portion of the soil between the land surface and the zone of saturation (the water table).

An ongoing groundwater monitoring program would be conducted to ensure that this remedy was protective.

Capital Cost	$191,000
O & M Cost	$106,700
Present Worth Cost	$738,000
Construction Time	10 months

COMPARATIVE ANALYSIS OF ALTERNATIVES

In selecting a remedy for a site, EPA considers the factors set forth in CERCLA §121, 42 U.S.C. §§9621, by conducting a detailed analysis of the viable remedial alternatives pursuant to the NCP, 40 CFR §300.430(e)(9) and EPA OSWER Directive 9355.3-01. The detailed analysis consists of an assessment of the individual alternatives against each of nine evaluation criteria and a comparative analysis focusing upon the relative performance of each alternative against those criteria.

- Overall protection of human health and the environment addresses whether or not a remedy provides adequate protection and describes how risks posed through each exposure pathway (based on a reasonable maximum exposure scenario) are eliminated, reduced, or controlled through treatment, engineering controls, or institutional controls.

- Compliance with applicable or relevant and appropriate requirements addresses whether or not a remedy would meet all of the applicable or relevant and appropriate requirements of other federal and state environmental statutes and regulations or provide grounds for invoking a waiver.

- Long-Term effectiveness and permanence refer to the ability of a remedy to maintain reliable protection of human health and the environment over time, once cleanup goals have been met. It also addresses the magnitude and effectiveness of the measures that may be required to manage the risk posed by treatment residuals and/or untreated wastes.

- Reduction of toxicity, mobility, or volume through treatment is the anticipated performance of the treatment technologies, with respect to these parameters, a remedy may employ.

- Short-Term effectiveness addresses the period of time needed to achieve protection and any adverse impacts on human health and the environment that may be posed during the construction and implementation period until cleanup goals are achieved.

- Implementability is the technical and administrative feasibility of a remedy, including the availability of materials and services needed to implement a particular option.

- Cost includes estimated capital and operation and maintenance costs, and net present-worth costs.

- State acceptance indicates whether, based on its review of the RI/FS reports and the Proposed Plan, the State concurs with, opposes, or has no comment on the preferred remedy at the present time.

- Community acceptance will be assessed in the ROD, and refers to the public's general response to the alternatives described in the Proposed Plan and the RI/FS reports.

A comparative analysis of these alternatives based upon the evaluation criteria noted above, follows.

Comparative Analysis for Soil Alternatives

1. Overall Protection of Human Health and the Environment
Alternatives S1 and S2 would not be protective of human health and the environment, since they would not actively address the contaminated soils which present unacceptable risks of exposure and are a source of groundwater contamination. Alternative S3 would be protective of human health and the environment in that the cap would prevent exposure to contaminated soil and would also serve to minimize infiltration of precipitation and thereby reduce leaching of chemicals from the soils to groundwater, hence, reducing contamination of the groundwater; however, Alternative S3 would not actively remediate contaminated soil. Alternatives S4, S5, and S6 would be protective of human health and the environment, since each alternative relies upon a remedial strategy or treatment technology capable of eliminating human exposure and removing the source of groundwater contamination.

2. Compliance with ARARs
The soil cleanup objectives used for the Site are based on NYSDEC values (*NYSDEC Subpart 375: Remedial Program Soil Cleanup Objectives* -and/or- NYSDEC's *Division Technical and Administrative Guidance Memorandum: Determination of Soil Cleanup Objectives and Cleanup Levels, Division of Hazardous Waste Remediation, January 24, 1994.)* These NYSDEC soil cleanup objectives were utilized as Preliminary Remediation Goals for the site-related contaminants.

Since the contamination in the soils would not be addressed under Alternatives S1 and S2, they would not achieve the soil cleanup objectives. While the cap installed under Soil Alternative S3 would comply with RCRA design standards, this alternative would not actively remediate contaminated soil and, as such, would not achieve the soil cleanup objectives. Alternatives S4 and S5 would each attain the soil cleanup objectives specified through treatment. Alternative S6 would involve the excavation and removal of the contaminated soil from the site, and, thereby, achieve soil cleanup objectives for the Site.

Alternatives S4 and S6 both involve the excavation of contaminated soils and would, therefore, require compliance with fugitive dust and VOC emission regulations. In addition, Alternative S6 would be subject to New York State and federal regulations related to the transportation and off-site treatment/disposal of wastes. In the case of Alternatives S4 and S5, compliance with air emission standards would be required for the SVE or ISVE system. Specifically, treatment of off-gases would have to meet the substantive requirements of New York State Regulations for Prevention and Control of Air Contamination and Air Pollution (6 NYCRR Part 200, et seq.) and comply with the substantive requirements of other state and federal air emission standards.

3. Long-Term Effectiveness and Permanence
Alternatives S1 and S2 would not involve any active remedial measures, and, as such, not be effective in eliminating the potential exposure to contaminants in soil and would result in the continued migration of contaminants from the soil to the groundwater. Alternative 3 involves installation of a landfill cover which would eliminate the potential exposure to contaminants in the soil and also reduce leaching of contaminants from the soil to groundwater. Alternatives S4, S5, and S6 would each be effective in the long term by either removing the contaminated soils from the Site or treating them in place.

4. Reduction in Toxicity, Mobility or Volume through Treatment
Alternatives S1 and S2 would provide no reduction in toxicity, mobility, or volume of contaminants. Alternative S3 would reduce the migration of contaminants from soil to groundwater but would not provide a reduction in toxicity or volume of

contaminants in the soil. Alternatives S4 and S5 would reduce toxicity, mobility, and volume of contaminants through on-site treatment. Under Alternative S6, the toxicity, mobility, and volume of the contaminants would be eliminated by removing contaminated soil from the Site property.

5. Short-Term Effectiveness

Alternative S1 and S2 do not include any physical construction measures in any areas of contamination and, therefore, would not present any potential adverse impacts to on-property workers or the community as a result of their implementation. Alternatives S3, S4, S5, and S6 could result in some adverse impacts to on-property workers through dermal contact and inhalation related to the installation of the remedial systems associated with each of these alternatives. Alternatives S4 and S6 involve significant excavation activities that would need to be properly managed to prevent or minimize adverse impacts. For instance, excavation activities would need to be properly managed to prevent transport of fugitive dust and exposure of workers through dermal contact and by inhalation of VOCs in the air. Noise from the treatment unit and the excavation work associated with Alternatives S3, S4, S5, and S6 could present some limited adverse impacts to on-property workers, while truck traffic related to Alternative S6 could provide nuisance impacts (e.g., noise and traffic) to nearby residents. In addition, interim and post-remediation soil sampling activities would pose some risk to on-property workers. The risks to on-property workers and nearby residents under all of the alternatives could, however, be mitigated by following appropriate health and safety protocols, by exercising sound engineering practices, and by using proper protective equipment.

Since no actions would be performed under Alternative S1, there would be no implementation time. Since only limited actions would be performed under Alternative S2, there would be very little implementation time. It is estimated that Alternative S3 would require a few months to complete the landfill cap, Alternative S4 would require 2 years to complete, Alternative S5 would require at least 4 years to complete, and Alternative S6 would require approximately one year to complete.

While efforts would be made to minimize the impacts, some disturbances would result from disruption of traffic, excavation activities on public and private land, noise, and fugitive dust emissions for Alternatives GW-2, GW-3, and GW-4. However, proper health and safety precautions and fugitive dust mitigation measures would minimize these impacts.

6. Implementability

The technologies presented in Alternatives GW-2, GW-3, and GW-4 have been used at other Superfund sites and have been proven effective.

Alternatives S1 and S2 would be the easiest soil alternatives to implement in that there are no field activities to undertake.

Alternatives S3, S4, S5, and S6 would all employ technologies known to be reliable (though the biocell proposed as a component of Alternative S4 is a lesser known technology relative to the site-related COCs) and that can be readily implemented. In addition, equipment, services, and materials needed for these alternatives are readily available, and the actions under these alternatives would be administratively feasible. Furthermore, sufficient facilities are available for the treatment/disposal of the excavated materials under Alternative S6.

Monitoring the effectiveness of the SVE system (in Alternative S4), and the ISVE system (in Alternative S5) would be easily accomplished through soil and soil-vapor sampling and analysis. Under Alternatives S4, S5, and S6, determining the extent of soil cleanup would be easily accomplished through post-excavation soil sampling and analysis.

7. Cost

The estimated capital, annual operation and maintenance (O&M) (including monitoring), and present-worth costs for each of the soil alternatives are presented in the table below. All costs are presented in U.S. Dollars.

Soil Alternative	Capital Cost	Annual O&M	Present Worth
S1	$ 0	$950	$15,000
S2	$12,600	$13,550	$217,000
S3	$2,290,000	$24,000	$2,647,000
S4	$2,388,000	$406,000	$3,119,000
S5	$1,211,000	$460,000	$2,302,000
S6	$11,208,000	$22,000	$11,228,000

According to the capital cost, O&M cost and present worth cost estimates, Alternative S1 has the lowest cost compared to Alternative S2, S3, S4, S5 and S6.

Comparative Analysis for Groundwater

1. Overall Protection of Human Health and the Environment
All alternatives except GW1 would provide adequate protection of human health and the environment. As noted above in the risk assessment section, there are unacceptable human health cancer risks or noncancer health hazards associated with the groundwater contamination at the site. Though no private wells exist on the Site property, the future use of groundwater as a drinking water source is consistent with the State use designation of the aquifer and such use would present unacceptable present and future carcinogenic and noncarcinogenic risks at the Site. These calculated risks to human health require EPA to implement remedial measures to reduce the risks associated with the observed contamination and restore the groundwater to beneficial use. EPA believes that Alternatives GW2, GW4 and GW5 would ultimately provide full protection of human health by reducing contaminant concentrations to cleanup objectives. Alternative GW3 would also reduce contaminant concentrations through treatment, would prevent migration of chemicals off-Site via groundwater transport, and, ultimately, restore the aquifer(s) to best use.

2. Compliance with ARARs

EPA and the New York State Department of Health (NYSDOH) have promulgated health-based protective MCLs (40 CFR Part 141, and 10NYCRR, Chapter 1 and Part 5), which are enforceable standards for various drinking water contaminants (chemical specific ARARs). The aquifer at the Site is classified as Class GA (6 NYCRR 701.18), meaning that it is designated as a potable water supply.

Alternative GW1 does not include any active groundwater remediation; contamination in the groundwater would likely attenuate naturally, to some degree, particularly after a soil remedy is implemented. Alternatives GW2, GW4, and GW5 involve the manipulation of Site groundwater conditions to enhance in-situ bioremediation of the COCs by the indigenous microbial population, and, thereby, break-down the COCs into nonhazardous compounds. Alternatives GW2, GW4, and GW5, each focus on treatment of the most contaminated regions of the bedrock and overburden aquifers (e.g., under and immediately downgradient of the source area) and, as such, would decrease the amount of time needed to achieve cleanup objectives. Following implementation of Alternatives GW2, GW4 or GW5, it is estimated that ARARs would be achieved throughout the Site in comparable time durations, within ten years, after the soil remedy is implemented. Under Alternative GW3, groundwater would be extracted from both the bedrock and the overburden aquifers, treated by a carbon adsorption system, and discharged to Beaverdam Brook. The discharge to Beaverdam Brook would comply with surface water discharge requirements and the disposition of treatment residuals would have to be consistent with the Resource Conservation and Recovery Act (RCRA). Alternative GW3 would prevent the potential migration of chemicals off Site via groundwater transport and, as such, ARARs would be met downgradient of the groundwater containment system (e.g., off the site property); ultimately, treatment of the contaminated groundwater would achieve ARARs within the site property and would restore the aquifer(s) to best use.

For Alternatives GW2, GW3, GW4, and GW5, compliance with ARARs would be demonstrated through a long-term groundwater monitoring program.

3. Long-Term Effectiveness and Permanence
Once the source control remedy is implemented, it is anticipated that all of the groundwater alternatives would achieve groundwater ARARs, although Alternative GW1 would be expected to take the longest. The time to achieve groundwater standards would vary for the other alternatives due to the complex nature of the subsurface environment.

Alternative GW3 would prevent the potential migration of chemicals off Site via groundwater transport, but would take longer to achieve cleanup objectives than Alternatives GW2, GW4, or GW5. As Alternatives GW2, GW4, and GW5 focus on the most contaminated regions of the bedrock and overburden aquifers, these alternatives would be expected to achieve aquifer restoration more quickly than the other alternatives.

4. Reduction in Toxicity, Mobility or Volume through Treatment
Alternatives GW2, GW4, and GW5 would each reduce the volume and toxicity of the contaminants through treatment by chemically breaking down the bulk of the dissolved VOC and SVOC contamination as it migrates through the aquifer. The VOC and SVOC contaminants would be changed into degradation products.

Alternative GW3 would reduce the toxicity, mobility, and volume of contaminated groundwater through removal and treatment with the goal of restoring the aquifers to their beneficial uses.

GW1 provides no further reduction in toxicity, mobility or volume of contaminants of any media through treatment. Following implementation of the source area remedy, natural attenuation processes would likely occur to some degree even under this alternative.

5. Short-Term Effectiveness
Alternative GW1 presents virtually no change to the short-term impacts to human health and the environment since no construction or active remediation is involved. Alternatives GW2, GW3, GW4, and GW5 each present some risk to on-property workers through dermal contact and inhalation from activities associated with groundwater remediation. Specifically, construction and remedial activities required to implement Alternatives GW2, GW4, and GW5 would potentially pose a risk of worker exposure to the oxygenating compound(s) when injected into the aquifer. The possibility of having to readminister

oxygenating compound(s) in future injections is likely. Alternative GW3 would potentially result in greater short-term exposure to contaminants to workers who install extraction wells and the groundwater tile collection system, as well as come into contact with the treatment system. In addition, under Alternatives GW2, GW3, GW4, and GW5, some adverse impacts would result from disruption of traffic, excavation activities, noise, and fugitive dust emissions. However, proper health and safety precautions would minimize short-term exposure risks as well as disturbances.

6. Implementability

Alternative GW-1 would be the easiest groundwater alternative to implement, since it would require no activities. Alternative GW3 would be the most difficult alternative to implement in that it would require the construction of a groundwater extraction system including piping and a tile water collection system. Alternative GW-2 would be easier to implement than Alternatives GW-4 and GW-5. The services and materials necessary for each of the groundwater alternatives are readily available. Under Alternatives GW-2, GW-3, GW-4, and GW-5, groundwater sampling would be necessary to monitor treatment effectiveness. Each of the alternatives have been proven effective for most, if not all, of the COCs in groundwater.

7. Cost

The estimated capital, annual operation and maintenance (O&M) (including monitoring), and present-worth costs for each of the groundwater alternatives are presented in the table below. All costs are presented in U.S. Dollars.

Groundwater Alternative	Capital Cost	Annual O&M	Present Worth
GW-1	$0	$950	$15,000
GW-2	$182,00	$106,700	$696,000
GW-3	$1,656,000	$229,000	$3,339,000
Gw-4	$332,000	$106,700	$846,000
GW-5	$191,000	$106,700	$738,000

Alternative GW-1 has the lowest cost compared to Alternative GW-2, GW-3, and GW-4; Alternative GW-3 has the highest cost.

8. State Acceptance
NYSDEC concurs with the selected remedy.

9. Community Acceptance
During the public comment period, the community expressed some concerns about the Selected Remedy. The attached Responsiveness Summary summarizes all of the community comments on the Proposed Plan and EPA's responses to those comments.

PRINCIPAL THREAT WASTE

The NCP establishes an expectation that EPA will use treatment to address the principal threats posed by a site wherever practicable (NCP Section 300.430 (a)(1)(iii)(A)). The "principal threat" concept is applied to the characterization of "source materials" at a Superfund site. A source material is material that includes or contains hazardous substances, pollutants, or contaminants that act as a reservoir for the migration of contamination to groundwater, surface water, or air, or act as a source for direct exposure. Principal threat wastes are those source materials considered to be highly toxic or highly mobile that generally cannot be reliably contained, or would present a significant risk to human health or the environment should exposure occur. The decision to treat these wastes is made on a site-specific basis through a detailed analysis of alternatives, using the remedy selection criteria which are described below. The manner in which principal threats are addressed provides a basis for making a statutory finding that the remedy employs treatment as a principal element.

Although treatment will be applied to the VOC contaminated soil and groundwater, there are no principal threats at the Nepera Site. The identified contamination is in the groundwater and on-site soils; no evidence was found during the remedial investigation that nonaqueous phase liquids are present within the aquifers. Soil sample results indicate that while source materials are present they are not considered to be highly toxic or highly mobile and could be contained. Therefore, no principal threat wastes are present at the Site.

SELECTED REMEDY

Based upon an evaluation of the various alternatives, EPA recommends a combination of Alternatives S4 and GW-2 (Soil excavation and treatment in a biocell combined with application of oxygenating compounds into the more contaminated areas of the water table aquifer), as the preferred alternative. This combination of alternatives would substantially reduce the amount of time needed to achieve cleanup objectives for both soil and groundwater.

Summary of the Rationale for the Selected Remedy

The EPA chose the soil remedy (excavation of contaminated soil, placement of the soil into a biocell which uses soil vapor extraction and bioremediation technologies) because this alternative best meets the cleanup objectives by treating contaminated soils at the Site. The alternative reduces the mobility and toxicity of the contaminated soils at the Site by removing the source materials.

The EPA chose the groundwater remedy (bioremediation with long-term groundwater monitoring) because this alternative best meets the cleanup objectives by treating groundwater contaminants exceeding remedial goals at the Site. Based on information used in evaluating the alternatives, the EPA and NYSDEC believe that the Preferred Alternative would be protective of human health and the environment, would comply with ARARs, would be cost-effective, and would utilize permanent solutions to the maximum extent practicable. Because it would treat the source materials, the remedy would also meet the statutory preference for the selection of a remedy that involves treatment as a principal element.

Description of Selected Remedy

The selected remedy includes the following components:

Excavation of Contaminated Soils: Site soils, which exceed New York State Department of Environmental Conservation (NYSDEC) soil cleanup objectives, within the former lagoons will be excavated and placed into a biocell

Treatment of Soils in the Biocell: Specifically, the biocell will operate as a dual-technology system utilizing SVE and biological degradation within an engineered below-grade biocell. The soils would be treated within the biocell by installing perforated pipes within multiple layers of the biocell. The perforated pipes would be connected to a blower unit to draw air through the piles; contaminants would be volatilized into this air. The air would be treated, if necessary, using carbon adsorption, prior to being recirculated or exhausted to the atmosphere. In addition, nutrients would be added to the treatment layers as required to enhance biological degradation. In general, the biocell would be operated in two primary modes: SVE mode (high air flow rate); and bioremediation mode (low air flow rate). During the SVE mode, the system would be operated at higher air flow rates which would be selected to optimize the removal of the VOCs constituents using SVE. After the removal rate of the VOCs decreases to an asymptotic or nominal rate, the system would be switched over to the bioremediation mode. During the bioremediation mode, the system would be operated at an optimized air flow rate selected to sustain the aerobic biodegradation of the remaining VOCs and SVOCs. Excavated soils would be treated to reach target cleanup levels.

Backfilling of Excavated Areas: The excavated areas of the Site, which are not utilized in the construction of the biocell will be backfilled to grade, using clean fill meeting NYSDEC soil cleanup objectives.

Bioremediation of Contaminants of Concern (COCs) in Site Groundwater: Bioremediation will be accomplished by enhancement of the indigenous microbial population through the introduction of oxygenating compounds into targeted areas of the groundwater aquifer. Bioremediation technology would be applied as an initial enhancement within the excavated area of the former lagoons (see Appendix I, Figure 2). The groundwater treatment systems would consist of application of oxygenating compounds into the excavated area of the former lagoons to create aerobic conditions in the aquifers conducive to biodegradation of the Site-related contaminants. This would allow the oxygenating compounds to flow radially outward from the lagoon area within the overburden aquifer and flow downward to also enhance biodegradation of contaminants in the bedrock aquifer. Multiple applications of the oxygenating compounds may be necessary. The remedial design will also consider the need for additional enhancements or injection points for the application of oxygenating compounds directly into the overburden aquifer and/or the bedrock aquifer. The actual method of application, number of applications or injections, the chemical usage, and the well spacing will be assessed and determined during the remedial design and remedial action. A treatability study may be required prior to design or implementation of remediation. Operational parameters will be determined during the remedial design and remedial action.

Long-term Groundwater Monitoring Program: A long-term groundwater monitoring program will be implemented to verify that the concentrations and the extent of the groundwater contaminants are declining. Results of the long-term groundwater monitoring will be used to evaluate the effectiveness of the remedy and to assess the need for additional injections/applications of oxygenating compounds. This program would also include the continued sampling of those private wells in the vicinity of the Site which are currently monitored. The frequency of the residential well sampling will be determined during Remedial Design.

Institutional Controls: To protect human health from exposure to the existing contamination while cleanup is ongoing, institutional controls, which include an environmental easement/restrictive covenant, will be filed in the property records of Orange County. The environmental easement/restrictive covenant will, at a minimum require: (a) restricting excavation or other activities that would interfere with constructed remedies (with the exception of Alternative S6 - Excavation and Off-Site Disposal), unless the excavation or other activities are in compliance with an EPA-approved site management plan; (b) restricting new construction at the Site unless an evaluation of the potential for vapor intrusion is conducted and mitigation, if necessary, is performed in compliance with an EPA-approved SMP and (c) restricting the use of groundwater as a source of potable or process water unless groundwater quality standards are met.

Site Management Plan: A SMP will be developed to address soil and groundwater at the Site and will provide for the proper management of all Site remedy components post-construction, including the institutional controls discussed above, and will also include: (a) monitoring of Site groundwater to ensure that, following remedy implementation, the groundwater quality improves; (b) provision for any operation and maintenance required of the components of the remedy; and (c) periodic certifications by the owner/operator or other person implementing the remedy that any institutional and engineering controls are in place.

Engineering Controls: Engineering controls consisting of fencing and posting signs would be implemented to prevent inadvertent exposure to Site contaminants by the local populace.

Contingency Plan: In the event that monitoring should indicate that the Village of Maybrook public water supply wells have been impacted by the Site-related contaminants above health-based levels, a contingency plan would be necessary to provide for a wellhead treatment for the Village of Maybrook wells on an interim basis pending further consideration of groundwater treatment alternatives to meet groundwater treatment standards; and.

Five-Year Review: Hazardous substances remain at this Site above levels that would not allow for unlimited use and unrestricted exposure for at least five years. Pursuant to Section 121(c) of CERCLA, EPA will review site remedies no less often than every five years. The first five-year review is due within five years of the date that construction is initiated for the remedial action. The current expectation is that construction will be initiated during the year 2010 and the first five-year review will be due in the year 2015.

Summary of the Estimated Remedy Costs: Detailed cost estimates for the Selected Remedy can be found in Appendix VI. The information in the cost estimate summary tables is based on the best available information regarding the anticipated scope of the remedial alternative. Changes in the cost elements are likely to occur as a result of new information and data collected during the engineering design of the remedial alternative. Major changes may be documented in the form of a memorandum in the Administrative Record file, an Explanation of Significant Difference, or a ROD amendment. This is an order-of-magnitude engineering cost estimate that is expected to be within +50% to -30% of the actual project cost.

Expected Outcomes of the Selected Remedy: The results of the human health risk assessment indicated that: there are unacceptable hazards from potential exposure to groundwater through ingestion and inhalation and to soils through contact and ingestion.

All groundwater at the Site is classified as GA, which is groundwater suitable as a source of drinking water. There is a future potential beneficial use of groundwater at the Site as a drinking water source.

The selected groundwater remedy will:

- Prevent or minimize potential, current, and future human exposures including inhalation of vapors and ingestion of groundwater contaminated with VOCs and SVOCs;
- Ultimately restore groundwater to levels which meet NYS Groundwater and Drinking Water Quality Standards once the entire Site remediation is accomplished.

The selected soil remedy will:

- Prevent exposure of human receptors to contaminated soils;
- Remediate contaminated soils and achieve soil cleanup objectives;

- Minimize migration of contaminants from soils to groundwater.

STATUTORY DETERMINATIONS

As previously noted, Section 121(b)(1) of CERCLA mandates that a remedial action must be protective of human health and the environment, be cost effective, and utilize permanent solutions and alternative treatment or resource recovery technologies to the maximum extent practicable. Section 121(b)(1) also establishes a preference for remedial actions which employ treatment to permanently and significantly reduce the volume, toxicity, or mobility of the hazardous substances, pollutants, or contaminants at the Site. Section 121(d) of CERCLA further specifies that a remedial action must attain a degree of cleanup that satisfies ARARs under federal and state laws, unless a waiver can be justified pursuant to section 121(d)(4) of CERCLA. As discussed below, EPA has determined that the Selected Remedy meets the requirements of Section 121 of CERCLA.

Protection of Human Health and the Environment

The Selected Remedy will adequately protect human health and the environment through removal of contaminants from both Site soil via excavation and treatment and Site groundwater via in-situ treatment through bioremediation.

Compliance with ARARs

At the completion of the response action, the remedy will have complied with appropriate ARARs (see Appendix II, Table G)

Cost-Effectiveness

EPA has determined that the selected remedy is cost effective in mitigating the principal risks posed by contaminated soil and groundwater. Section 300.430(f)ii)(D) of the NCP requires evaluation of cost effectiveness. Overall effectiveness is determined by the following three balancing criteria: long-term effectiveness and permanence; reduction of toxicity, mobility, and volume through treatment; and short-term effectiveness. Overall effectiveness is then compared to cost to ensure that the remedy is cost effective. The selected remedy meets the criteria and provides for overall effectiveness in proportion to its cost. The estimated present worth of the Selected Remedy is $3,815,000.

Utilization of Permanent Solutions and Alternative Treatment Technologies to the Maximum Extent Practicable

EPA has determined that the selected remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable, and provides the best balance of trade-offs in terms of the five balancing criteria, while also considering the statutory preference for treatment as a principal element and considering State and community acceptance.

Of those alternatives considered to address the groundwater contamination at the Site, the selected remedy is a permanent remedy that treats the soil and the groundwater. The ex-situ component of the remedy (Soil Alternative S4) will reduce the mass of contaminants in the subsurface, thereby reducing the toxicity, mobility, and volume of contamination. The in-situ component of the remedy (Groundwater Alternative GW-2) will also reduce the mass of contaminants in the subsurface and holds the advantage of accelerating the cleanup at the Site.

Preference for Treatment as a Principal Element

By using a combination of ex-situ treatment processes, as well as in-situ treatment, the Selected Remedy satisfies the statutory preference for remedies that employ treatment as a principal element.

Five-Year Review Requirements

Hazardous substances remain at this Site above levels that would allow for unlimited use and unrestricted exposure. Pursuant to Section 121(c) of CERCLA, EPA will review site remedies no less often than every five years. The first five-year review is due within five years of the date that construction is initiated. The current expectation is that construction will be initiated by the year 2010 and the first five-year review will be due before the year 2015.

DOCUMENTATION OF SIGNIFICANT CHANGES

The Proposed Plan for the Nepera Chemical Company Superfund Site was released for public comment on July 31, 2007 and the public comment period ran from that date through August 29, 2007. The Proposed Plan identified Soil Alternative S4 and Groundwater Alternative GW-2 as the Preferred Alternatives.

All written and verbal comments submitted during the public comment period were reviewed by EPA. Though two components have been added to the selected remedy (namely, a contingency plan to provide for a wellhead treatment for the Village of Maybrook wells on an interim basis, if the wells are ever impacted by site-related contaminants, and continuation of an ongoing monitoring program which monitors private wells in the vicinity of the Site) EPA has determined that no significant changes to the remedy, as it was originally identified in the Proposed Plan, are necessary.

APPENDICES

Appendix I

Figures

FIGURE 1

SITE LOCATION MAP

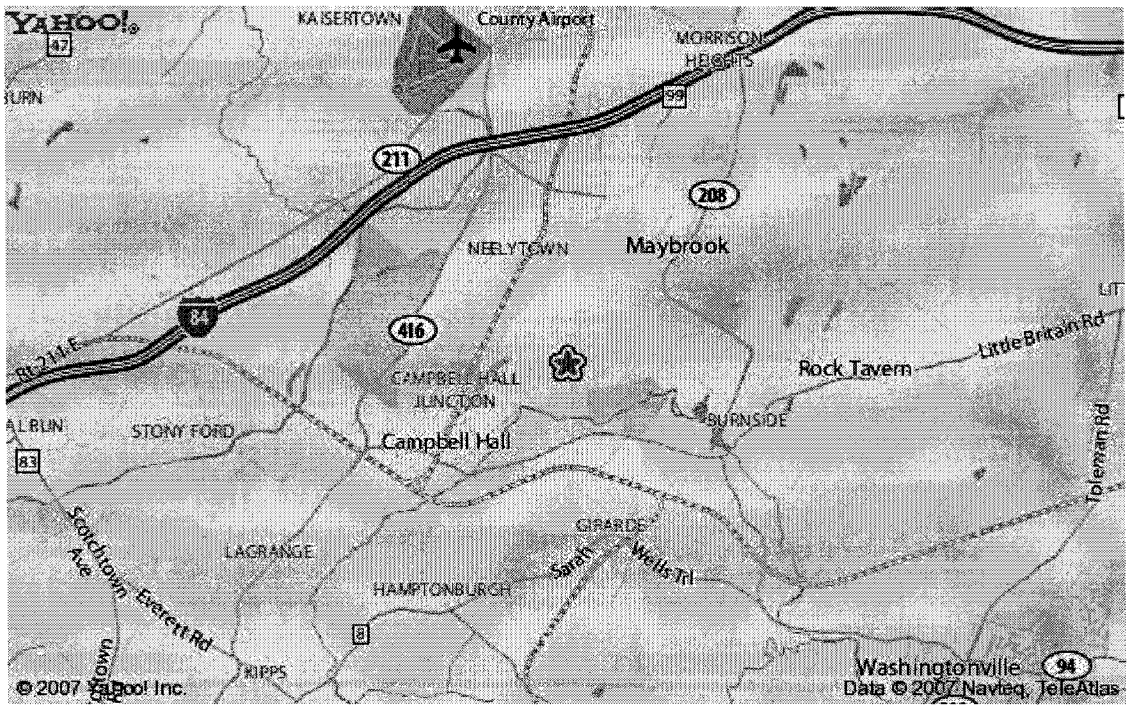

FIGURE 2

SITE ILLUSTRATION

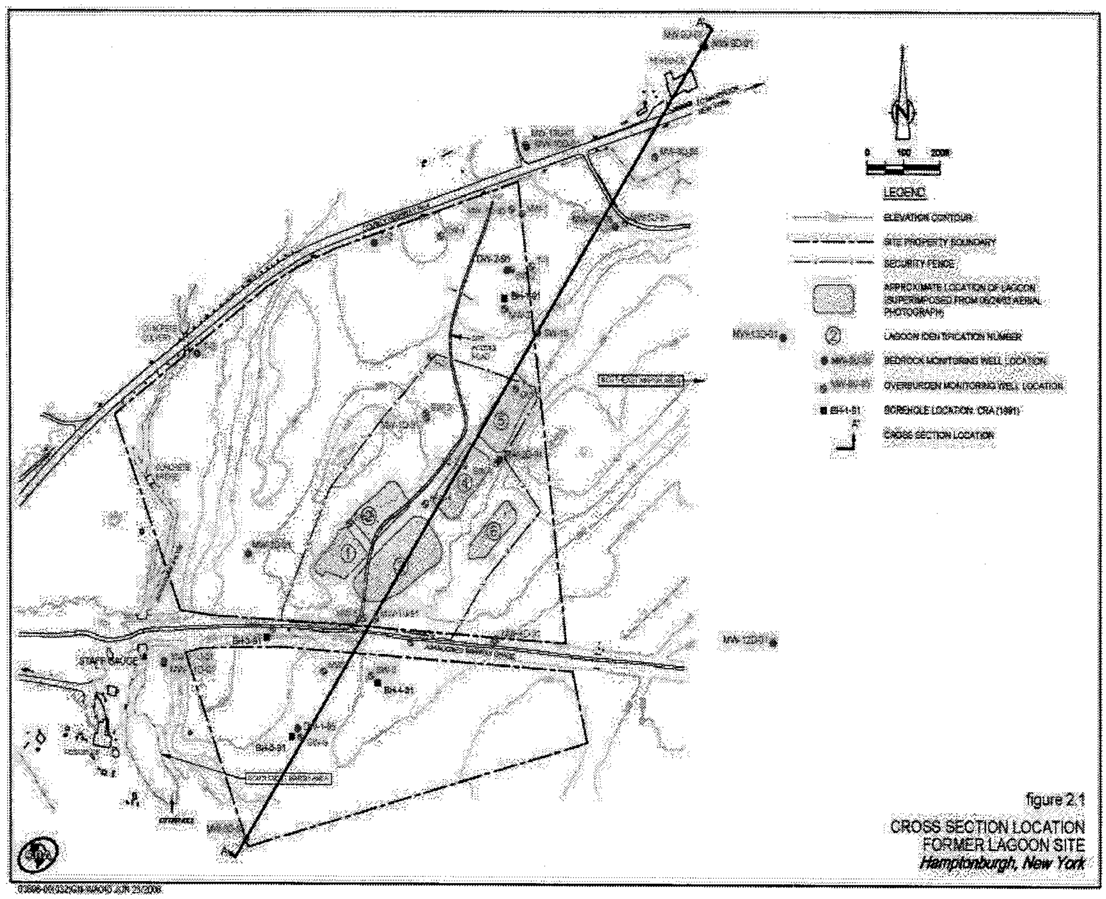

FIGURE 3

AERIAL PHOTOGRAPH OF SITE (1963)

figure 3.12

1963 AERIAL PHOTOGRAPH
FORMER LAGOON SITE
Hamptonburgh, New York

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APPENDIX II

Tables

TABLE A

Summary of Chemicals of Concern and Medium-Specific Exposure Point Concentrations

Scenario Timeframe: Current/Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Point	Chemical of Concern	Concentration Detected		Concentration Units	Frequency of Detection	Exposure Point Concentration (EPC)	EPC Units	Statistical Measure
		Min	Max					
Tap Water[1]	Benzene	0.60	1100	µg/L	18/32	330	µg/L	95% UCL-NP
	Xylenes	1.0	520	µg/L	9/32	270	µg/L	95% UCL-NP
	Aniline	9	16	µg/L	2/2	16	µg/L	Max
	2-Aminopyridine	1.0	520	µg/L	12/32	189	µg/L	95% UCL-NP

95% UCL-NP: 95% Upper Confidence Limit for Nonparametric Data

Max: Maximum Detected Concentration

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Soil

Exposure Point	Chemical of Concern	Concentration Detected		Concentration Units	Frequency of Detection	Exposure Point Concentration (EPC)	EPC Units	Statistical Measure
		Min	Max					
Soil	Benzene	2	13000	µg/Kg	15/55	4440	µg/Kg	95% UCL-NP
	Toluene	1	52000	µg/Kg	25/55	10000	µg/Kg	95% UCL-NP
	Chlorobenzene	2	12000	µg/Kg	20/55	1000	µg/Kg	95% UCL-NP
	Xylenes	2	300000	µg/Kg	24/55	69000	µg/Kg	95% UCL-NP
	2-Aminopyridine	150	99000	µg/Kg	24/55	23400	µg/Kg	95% UCL-NP

95% UCL-NP: 95% Upper Confidence Limit for Nonparametric Data

Summary of Chemicals of Concern and Medium-Specific Exposure Point Concentrations

This table presents the chemicals of concern (COCs) and exposure point concentrations (EPCs) for each of the COCs detected in soil and groundwater (i.e., the concentration that will be used to estimate the exposure and risk from each COC in soil and groundwater). The table includes the range of concentrations detected for each COC, as well as the frequency of detection (i.e., the number of times the chemical was detected in the samples collected at the site), the EPC and how it was derived.

TABLE B
SELECTION OF EXPOSURE PATHWAYS

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	On/Off-Site	Type of Analysis	Rationale for Selection or Exclusion Of Exposure Pathway
Current	Groundwater	Groundwater	Tap Water	Residents	Child & Adult	Dermal/ Ingestion	Off-Site	Quant	Potential exposure to groundwater by offsite residents.
		Air	Water Vapors at Showerhead	Residents	Child & Adult	Inhalation	Off-Site	Quant	Potential exposure to groundwater by offsite residents.
	Site Surface Soil	Surface Soil	Surface Soil	Trespassers	Adoles.	Dermal/ Ingestion	On-Site	Quant	Potential exposure to site surface soils by trespasser.
	Lagoon 6 Surface Soil	Surface Soil	Surface Soil	Trespassers	Adoles.	Dermal/ Ingestion	On-Site	Quant	Potential exposure to site surface soils by trespasser.
	Beaverdam Brook/ Otter Kill Surface Water	Surface Water	Surface Water	Trespassers	Adoles.	Dermal	On-Site	Quant	Potential exposure to surface water in Beaverdam Brook and/or Otter Kill by trespassers.
	Southwest Marsh Sediment	Sediment	Sediment	Trespassers	Adoles.	Dermal/ Ingestion	On-Site	Quant	Potential exposure to sediments in the Southwest Marsh Area by trespassers.
Current/ Future	Northeast Marsh Sediment	Sediment	Sediment	Occasional Visitors/ Hikers	Adoles.	Dermal/ Ingestion	Off-Site	Quant	Potential exposure to sediments in the Northeast Marsh Area by hikers.
	Northeast Marsh Surface Water	Surface Water	Surface Water	Occasional Visitors/ Hikers	Adoles.	Dermal/ Ingestion	Off-Site	Quant	Potential exposure to surface water in the Northeast Marsh Area by hikers.
	Otter Kill Creek Surface Water	Fish	Fish	Recreat. Anglers	Child & Adult	Ingestion	On/ Off-Site	Quant	Potential exposure to fish in Otter Kill Creek by recreational anglers.
Future	Groundwater	Groundwater	Tap Water	Residents	Child & Adult	Dermal/ Ingestion	On-Site	Quant	Potential exposure to groundwater by future on-site residents.
		Air	Water Vapors at Showerhead	Residents	Child & Adult	Inhalation	On-Site	Quant	Potential exposure to groundwater by offsite residents.
		Groundwater	Groundwater	Construct. Workers	Adult	Dermal/ Ingestion	On-Site	Quant	Potential exposure to groundwater by construction workers during ground intrusive activities.
		Ambient Air	Ambient Air	Construct. Workers	Adult	Inhalation	On-Site	Quant	Potential exposure to ambient air by construction workers during ground intrusion activities.

TABLE B – SELECTION OF EXPOSURE PATHWAYS (Cont.)

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	On/Off Site	Type of Analysis	Rationale for Selection or Exclusion Of Exposure Pathway
Future (Cont.)	Site Surface Soil	Surface Soil	Surface Soil	Park Users	Child & Adult	Dermal/ Ingestion	On-site	Quant	Potential exposure to site surface soils by park users.
	Lagoon 6 Surface Soil	Surface Soil	Surface Soil	Park Users	Child & Adult	Dermal/ Ingestion	On-Site	Quant	Potential exposure to site surface soils by park users.
	Site Surface Soil	Surface Soil	Surface Soil	Residents	Child & Adult	Dermal/ Ingestion	On-site	Quant	Potential exposure to site surface soils by residents.
	Lagoon 6 Surface Soil	Surface Soil	Surface Soil	Residents	Child & Adult	Dermal/ Ingestion	On-Site	Quant	Potential exposure to site surface soils by residents.
	Site Surface Soil	Surface Soil	Surface Soil	Park Mainten. Workers	Adult	Dermal/ Ingestion	On-Site	Quant	Potential exposure to site surface soils by park maintenance workers.
	Lagoon 6 Surface Soil	Surface Soil	Surface Soil	Park Mainten. Workers	Adult	Dermal/ Ingestion	On-Site	Quant	Potential exposure to site surface soils by park maintenance workers.
	Site Soils	Soil	Soil	Construct. Workers	Adult	Dermal/ Ingestion	On-Site	Quant	Potential exposure to site soils by construction workers during ground intrusive activities.
		Ambient Air	Ambient Air	Construct. Workers	Adult	Inhalation	On-Site	Quant	Potential exposure to ambient air by construction workers during ground intrusive activities.
	Lagoon 6 Soils	Soil	Soil	Construct. Workers	Adult	Dermal/ Ingestion	On-Site	Quant	Potential exposure to site soils by construction workers during ground intrusive activities.
		Ambient Air	Ambient Air	Construct. Workers	Adult	Inhalation	On-Site	Quant	Potential exposure to ambient air by construction workers during ground intrusive activities.
	Southwest Marsh Area Sediment	Sediment	Sediment	Recreat. Users	Child & Adult	Dermal	On-Site	Quant	Potential exposure to sediment in the Southwest Marsh Area by recreational users.
	Beaverdam Brook Surface Water	Surface Water	Surface Water	Recreat. Users	Child & Adult	Dermal	On-Site	Quant	Potential exposure to surface water in the Beaverdam Brook by recreational users.
	Otter Kill Surface Water	Surface Water	Surface Water	Recreat. Users	Child & Adult	Dermal	On-Site	Quant	Potential exposure to surface water in the Otter Kill by recreational users.

Quant = Quantitative risk analysis performed.

Summary of Selection of Exposure Pathways

The table describes the exposure pathways associated with the groundwater that were evaluated for the risk assessment, and the rationale for the inclusion of each pathway. Exposure media, exposure points, and characteristics of receptor populations are included.

TABLE C

Non-Cancer Toxicity Data Summary

Pathway: Oral/Dermal

Chemical of Concern	Chronic/ Subchronic	Oral RfD Value	Oral RfD Units	Absorp. Efficiency (Dermal)	Adjusted RfD (Dermal)	Adj. Dermal RfD Units	Primary Target Organ	Combined Uncertainty /Modifying Factors	Sources of RfD: Target Organ	Dates of RfD:
Benzene	Chronic	4.0E-3	mg/kg-day	100%	4.0E-3	mg/kg-day	Blood	300	IRIS	11/10/04
Toluene	Chronic	2.0E-01	mg/kg-day	100%	2.0E-01	mg/kg-day	Liver	1000	IRIS	11/10/04
Xylenes	Chronic	2.0E-01	mg/kg-day	100%	2.0E-01	mg/kg-day	Body Weight	1000	IRIS	11/10/04
Aniline	Chronic	7.0E-03	mg/kg-day	NA	7.0E-03	mg/kg-day	Spleen	3000	R3 RBC	10/08/04
Chlorobenzene	Chronic	2.0E-02	mg/kg-day	100%	2.0E-02	mg/kg-day	Liver	1000	IRIS	11/10/04
2-Aminopyridine	Chronic	2.0E-05	mg/kg-day	100%	2.0E-05	mg/kg-day	Liver	10000	HEAST	07/01/97

Pathway: Inhalation

Chemical of Concern	Chronic/ Subchronic	Inhalation RfC	Inhalation RfC Units	Inhalation RfD	Inhalation RfD Units	Primary Target Organ	Combined Uncertainty /Modifying Factors	Sources of RfD: Target Organ	Dates:
Benzene	Chronic	3.0E-02	mg/m3	8.6E-03	mg/kg-day	Blood	1000	IRIS	11/10/04
Toluene	Chronic	4.0E-01	mg/m3	1.14E-01	mg/kg-day	Liver	300	IRIS	11/10/04
Xylenes	Chronic	1.0E-01	mg/m3	3.0E-02	mg/kg-day	CNS	300	IRIS	11/10/04
Aniline	Chronic	NA	mg/m3	2.86E-04	mg/kg-day	Spleen	NA	R3 RBC	10/08/04
Chlorobenzene	Chronic	6.0E-02	mg/m3	1.7E-02	mg/kg-day	Liver	NA	R3 RBC	10/08/04
2-Aminopyridine	Chronic	NA	mg/m3	NA	mg/kg-day			NA	11/10/04

Key

NA: No information available
IRIS: Integrated Risk Information System, U.S. EPA
NCEA: National Center for Environmental Assessment
HEAST: Health Effects Assessment Summary Tables
R3 RBC: EPA Region 3 Risk-Based Concentration Table
CNS: Central Nervous System

Summary of Toxicity Assessment

This table provides non-carcinogenic risk information which is relevant to the contaminants of concern in soil and groundwater. When available, the chronic toxicity data have been used to develop oral reference doses (RfDs) and inhalation reference doses (RfDi).

TABLE D

Cancer Toxicity Data Summary

Pathway: Oral/Dermal

Chemical of Concern	Oral Cancer Slope Factor	Units	Adjusted Cancer Slope Factor (for Dermal)	Slope Factor Units	Weight of Evidence/ Cancer Guideline Description	Source	Date
Benzene	5.5E-02	$(mg/kg/day)^{-1}$	5.5E-02	$(mg/kg/day)^{-1}$	A	IRIS	11/10/04
Toluene	NA	$(mg/kg/day)^{-1}$	NA	$(mg/kg/day)^{-1}$	D	IRIS	11/10/04
Xylenes	NA	$(mg/kg/day)^{-1}$	NA	$(mg/kg/day)^{-1}$	D	IRIS	11/10/04
Aniline	5.7E-03	$(mg/kg/day)^{-1}$	5.7E-03	$(mg/kg/day)^{-1}$	B2	IRIS	11/10/04
Chlorobenzene	NA	$(mg/kg/day)^{-1}$	NA	$(mg/kg/day)^{-1}$	D	IRIS	11/10/04
2-Aminopyridine	NA	$(mg/kg/day)^{-1}$	NA	$(mg/kg/day)^{-1}$	D	IRIS	11/10/04

Pathway: Inhalation

Chemical of Concern	Unit Risk	Units	Inhalation Slope Factor	Slope Factor Units	Weight of Evidence/ Cancer Guideline Description	Source	Date
Benzene	7.8E-06	$(mg/m^3)^{-1}$	2.7E-02	$(mg/kg\text{-}day)^{-1}$	A	IRIS	11/10/04
Toluene	NA	$(mg/m^3)^{-1}$	NA	$(mg/kg\text{-}day)^{-1}$	D	IRIS	11/10/04
Xylenes	NA	$(mg/m^3)^{-1}$	NA	$(mg/kg\text{-}day)^{-1}$	D	IRIS	11/10/04
Aniline	NA	$(mg/m^3)^{-1}$	NA	$(mg/kg\text{-}day)^{-1}$	D	IRIS	11/10/04
Chlorobenzene	NA	$(mg/m^3)^{-1}$	NA	$(mg/kg\text{-}day)^{-1}$	D	IRIS	11/10/04
2-Aminopyridine	NA	$(mg/m^3)^{-1}$	NA	$(mg/kg\text{-}day)^{-1}$	D	IRIS	11/10/04

Key:

IRIS: Integrated Risk Information System. U.S. EPA
NA: No information available

EPA Weight of Evidence:

A - Human carcinogen
B1 - Probable Human Carcinogen-Indicates that limited human data are available
B2 - Probable Human Carcinogen-Indicates sufficient evidence in animals associated with the site and inadequate or no evidence in humans
C - Possible human carcinogen
D - Not classifiable as a human carcinogen
E- Evidence of noncarcinogenicity

Summary of Toxicity Assessment

This table provides carcinogenic risk information which is relevant to the contaminants of concern in soil and groundwater. Toxicity data are provided for both the oral and inhalation routes of exposure.

TABLE E

Risk Characterization Summary - Noncarcinogens

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child & Adult

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Primary Target Organ	Non-Carcinogenic Risk			
					Ingestion	Inhalation	Dermal	Exposure Routes Total
Ground-water	Ground-water	Tap Water	Benzene	Blood	5	16	0.8	21
			Xylenes	CNS	0.08	4	0.05	4
			Aniline	Spleen	0.1	23	0.003	23
			2-Aminopyridine	Liver	570	--	6	570
Groundwater Hazard Index Total [1] =								620
Total Liver HI =								570
Total Spleen HI =								23
Total Blood HI =								21
Total Central Nervous System HI =								4

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Primary Target Organ	Non-Carcinogenic Risk			
					Ingestion	Inhalation	Dermal	Exposure Routes Total
Soils	Soils	Soils	Benzene	Blood	0.001	42	--	42
			Toluene	Liver	--	7	--	7
			Chlorobenzene	Liver	--	5	--	5
			Xylenes	Body Weight	--	61	--	61
			2-Aminopyridine	Liver	1.3	--	0.2	2
Soils Hazard Index Total [1] =								120
Total Liver HI =								14
Total Body Weight HI =								61
Total Blood HI =								42

The HI represents the summed HQs for all chemicals of potential concern at the site, not just those chemicals requiring remedial action which are shown here.

Summary of Risk Characterization - Non-Carcinogens

The table presents hazard quotients (HQs) for each route of exposure and the hazard index (sum of hazard quotients) for all routes of exposure. The Risk Assessment Guidance for Superfund states that, generally, a hazard index (HI) greater than 1 indicates the potential for adverse non-cancer effects.

TABLE F

Risk Characterization Summary - Carcinogens

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child & Adult

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Carcinogenic Risk			
				Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	Tap Water	Benzene	3E-04	7E-04	1E-05	1E-03
						Total Risk =	1E-03

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Carcinogenic Risk			
				Ingestion	Inhalation	Dermal	Exposure Routes Total
Soils	Soils	Soils	Benzene	4E-09	1E-04	--	1E-04
						Total Risk =	1E-04

Summary of Risk Characterization - Carcinogens

The table presents cancer risks for each route of exposure and for all routes of exposure combined. As stated in the National Contingency Plan, the acceptable risk range for site-related exposure is 10^{-6} to 10^{-4}.

Table G ARARs, Criteria, and Guidance Nepera Chemical Company, Inc Site Hamptonburgh, New York		
Regulatory Level	**ARARs, Criteria, and Guidance**	**Requirement Synopsis**
Federal	National Primary Drinking Water Standards (40 CFR Part 141) Maximum Contaminant Levels (MCLs) and Maximum Contaminant Level Goals (MCLGs). Safe Drinking Water Act (SDWA) [42 U.S.C.§ 300F et. Seq.)	Establishes health-based standards for public drinking water systems. Also establishes drinking water quality goals set at levels at which no adverse health effects are anticipated, with an adequate margin of safety.
State	New York Surface Water and Groundwater Quality Standards and Groundwater Effluent Limitations (6NYCRR Part 703)	Establish numerical standards for groundwater and surface water cleanups.
State	New York State Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations (Technical and Operational Guidance Series 1.1.1)	Provides ambient water quality guidance values and groundwater effluent limitations for use where there are no standards.
State	New York State Department of Health Drinking Water Standards (10NYCRR Part 5)	Sets maximum contaminant levels (MCLs) for public drinking water supplies.

Table G ARARs, Criteria, and Guidance Nepera Chemical Company, Inc Site Hamptonburgh, New York		
Regulatory Level	**ARARs, Criteria, and Guidance**	**Requirement Synopsis**
State	Environmental Remediation Programs, 6 NYCRR Part 375, Remedial Program Soil Cleanup Objectives, Subpart 375-6, Unrestricted Use Soil Cleanup Objectives, Table 375-6.8(a) and Restricted Use Soil Cleanup Objectives, Table 375-6.8(b)	Establish numerical and procedural standards for soil cleanups.

Regulatory Level	ARARs, Criteria, and Guidance	Requirement Synopsis
Federal	Statement on Procedures on Floodplain Management and Wetlands protection (40 CFR 6 Appendix A)	This Statement of Procedures sets forth Agency policy and guidance for carrying out the provisions of Executive Orders 11988 and 11990.
Federal	Policy on Floodplains and Wetland Assessments for CERCLA Actions (OSWER Directive 9280.0-12, 1985)	Superfund actions must meet the substantive requirements of E.O. 11988, E.O. 11990, and 40 CFR part 6, Appendix A.
Federal	National Environmental Policy Act (NEPA) (42 USC 4321; 40 CFR 1500 to 1508)	This requirement sets forth EPA policy for carrying out the provisions of the Wetlands Executive Order (EO 11990) and Floodplain Executive Order (EO 11988).
General	National Historic Preservation Act (40 CFR 6.301)	This requirement establishes procedures to provide for preservation of historical and archeological data that might be destroyed through alteration of terrain as a result of a federal construction project or a federally licensed activity or program.
State	Endangered and Threatened Species of Fish and Wildlife (Part 182)	Standards for the protection of threatened and endangered species

ARARs, Criteria, and Guidance	Requirement Synopsis
RCRA Identification and Listing of Hazardous Wastes (40 CFR 261)	Describes methods for identifying hazardous wastes and lists known hazardous wastes.
RCRA Standards Applicable to Generators of Hazardous Wastes (40 CFR 262)	Describes standards applicable to generators of hazardous wastes.
RCRA—Standards for Owners/Operators of Permitted Hazardous Waste Facilities (40 CFR 264.10–164.18)	This regulation lists general facility requirements including general waste analysis, security measures, inspections, and training requirements.
RCRA—Preparedness and Prevention (40 CFR 264.30–264.31)	This regulation outlines the requirements for safety equipment and spill control.
RCRA—Contingency Plan and Emergency Procedures (40 CFR 264.50–264.56)	This regulation outlines the requirements for emergency procedures to be used following explosions, fires, etc.
New York Hazardous Waste Management System – General (6 NYCRR Part 370)	This regulation provides definition of terms and general standards applicable to hazardous wastes management system.
New York Solid Waste Management Regulations (6 NYCRR 360)	Sets standards and criteria for all solid waste management facilities, including design, construction, operation, and closure requirements for the municipal solid waste landfills.
New York Identification and Listing of Hazardous Waste (6 NYCRR Part 371)	Describes methods for identifying hazardous wastes and lists known hazardous wastes.
Department of Transportation (DOT) Rules for Transportation of Hazardous Materials (49 CFR Parts 107, 171, 172, 177 to 179)	This regulation outlines procedures for the packaging, labeling, manifesting, and transporting hazardous materials.
RCRA Standards Applicable to Transporters of Hazardous Waste (40 CFR 263)	Establishes standards for hazardous waste transporters.
New York Hazardous Waste Manifest System and Related Standards for Generators, Transporters and Facilities (6 NYCRR Part 372)	Establishes record keeping requirements and standards related to the manifest system for hazardous wastes.
New York Waste Transporter Permit Program (6 NYCRR Part 364)	Establishes permit requirements for transportations of regulated waste.

ARARs, Criteria, and Guidance	Requirement Synopsis
New York Standards for Universal Waste (6 NYCRR Part 374-3) and Land Disposal Restrictions (6 NYCRR Part 376)	These regulations establish standards for treatment and disposal of hazardous wastes.
Safe Drinking Water Act – Underground Injection Control Program (40 CFR 144, 146)	Establish performance standards, well requirements, and permitting requirements for groundwater re-injection wells
New York Regulations on State Pollution Discharge Elimination System (SPDES) (6 NYCRR parts 750-757)	This permit governs the discharge of any wastes into or adjacent to State waters that may alter the physical, chemical, or biological properties of State waters, except as authorized pursuant to a NPDES or State permit.
New York Surface Water and Groundwater Quality Standards and Groundwater Effluent Limitations (6NYCRR Part 703)	Establish numerical criteria for groundwater treatment before discharge.
New York State Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations (TOGS 1.1.1)	Provides groundwater effluent limitations for use where there are no standards.
Clean Air Act (CAA)—National Ambient Air Quality Standards (NAAQs) (40 CFR 50)	These provide air quality standards for particulate matter and volatile organic matter.
Federal Directive – Control of Air Emissions from Superfund Air Strippers (OSWER Directive 9355.0-28)	These provide guidance on the use of controls for superfund site air strippers as well as other vapor extraction techniques in attainment and non-attainment areas for ozone.
New York General Prohibitions (6 NYCRR Part 211)	Prohibition applies to any particulate, fume, gas, mist, odor, smoke, vapor, pollen, toxic or deleterious emissions.
New York Air Quality Standards (6 NYCRR Part 257)	This regulation requires that maximum 24-hour concentrations for particulate matter not be exceeded more than once per year. Fugitive dust emissions from site excavation activities must be maintained below 250 micrograms per cubic meter ($\mu g/m^3$).

ARARs, Criteria, and Guidance	Requirement Synopsis
New York Division of Air Resources DAR-1 (Air Guide-1) AGC/SGC Tables	The tables provide guideline concentrations for toxic ambient air contaminants.

APPENDIX III

ADMINISTRATIVE RECORD INDEX

NEPERA CHEMICAL CO., INC.
ADMINISTRATIVE RECORD FILE
INDEX OF DOCUMENTS*

3.0 REMEDIAL INVESTIGATION

3.4 Remedial Investigation Reports

P. 300001 - 300600 Report: Remedial Investigation Report, Maybrook Lagoon Site, Town of Hamptonburgh, Orange County, New York, Volume I of IV - Text, Figures and Tables, prepared by Conestoga-Rovers & Associates (CRA) on behalf of the Maybrook and Harriman Environmental Trust, June 2006.

P. 300601 - 301339 Report: Remedial Investigation Report, Maybrook Lagoon Site, Town of Hamptonburgh, Orange County, New York, Volume II of IV - Appendices A to K, prepared by Conestoga-Rovers & Associates (CRA) on behalf of the Maybrook and Harriman Environmental Trust, June 2006.

P. 301340 - 302907 Report: Remedial Investigation Report, Maybrook Lagoon Site, Town of Hamptonburgh, Orange County, New York, Volume III of IV - Appendix L, prepared by Conestoga-Rovers & Associates (CRA) on behalf of the Maybrook and Harriman Environmental Trust, June 2006.

* Data are summarized in several of these documents. The actual data, QA/QC, chain of custody, etc. are compiled at various EPA offices and can be made available at the record repository upon request. Bibliographies in the documents and in the references cited in the Record of Decision are incorporated by reference in the Administrative Record. Many of these documents referenced in the bibliographies are publicly available and readily accessible. Most of the guidance documents referenced in the bibliographies are available on the EPA website (www.epa.gov). If copies of the documents cannot be located, contact the EPA Project Manager (Mark Dannenberg at (212) 637-4251). Copies of the administrative record documents that are not available in the administrative record repository at the Hamptonburgh Town Hall can be made available at that location upon request.

P. 302908 - 303784 Report: Remedial Investigation Report, Maybrook Lagoon Site, Town of Hamptonburgh, Orange County, New York, Volume IV of IV - Appendices M to T, prepared by Conestoga-Rovers & Associates (CRA) on behalf of the Maybrook and Harriman Environmental Trust, June 2006.

4.0 FEASIBILITY STUDY

4.3 Feasibility Study Reports

P. 400001 - 400362 Report: Feasibility Study Report, Maybrook Lagoon Site, Town of Hamptonburgh, Orange County, New York, prepared by Conestoga-Rovers & Associates (CRA) on behalf of the Maybrook and Harriman Environmental Trust, June 2007.

3.0 REMEDIAL INVESTIGATION

3.1 Sampling and Analysis Plans

P. 303785 - 303840 Report: Quality Assurance Project Plan, Additional Investigation, Former Lagoon Site, Hamptonburgh, New York, prepared by Conestoga-Rovers & Associates (CRA) on behalf of the Maybrook and Harriman Environmental Trust, March 2001.

P. 303841 - 303977 Report: Additional Soil Sampling Work Plan, Maybrook Lagoon Site, Hamptonburgh, New York, prepared by Conestoga-Rovers & Associates (CRA) on behalf of the Maybrook and Harriman Environmental Trust, March 2003.

3.2 Sampling and Analysis Data/Chain of Custody Forms

P. 303978 - 304614 Report: Sampling Report and Data Presentation, Nepera Chemical, Hamptonburgh, New York, Sampling of the Sediment in Beaverdam Brook, prepared by Mr. Michael A. Mercado, Environmental Scientist, Hazardous Waste Support Branch (DESA/HWSB), U.S. Environmental Protection Agency, May 12-16, 2003.

4.0 FEASIBILITY STUDY

4.6 Correspondence

P. 400363 - 400366 Letter to Mr. George H. Hollerbach, Jr., P.E., Project Manager, Quantum Management Group Inc., c/o Pfizer Inc., from Mr. Mark Dannenberg, Remedial Project Manager, U.S. Environmental Protection Agency, Region 2, re: Feasibility Study Report, Nepera (Maybrook) Site, Town of Hamptonburgh, New York, May 4, 2007.

P. 400367 - 400378 Letter to Mr. Mark Dannenberg, Remedial Project Manager, U.S. Environmental Protection Agency, Region 2, from Mr. Randy Moore, P.Eng., Conestoga-Rovers & Associates, re: Final Feasibility Study Transmittal, Comments on Feasibility Study Cover Letter - May 4, 2007, Former Lagoon Site (Site) - Town of Hamptonburgh, New York, June 26, 2007.

7.0 ENFORCEMENT

7.4 Consent Decrees

P. 700001 - 700023 Stipulation Agreement between the New York State Department of Environmental Conservation and the Respondents (Nepera, Inc., Warner-Lambert Company, Estate of William S. Lasdon), March 21, 1988.

P. 700024 - 700130 Consent Decree Between State of New York and Estate of William S. Lasdon, Nepera, Inc., and Warner-Lambert Company and Order of Dismissal, (Attachments: Escrow Agreement, the Private Party Settlement Agreement, and the Stipulation of Dismissal with Prejudice), May 1, 1998.

7.6 Documentation of Technical Discussions with PRP's

P. 700131 - 700135 Letter to Mr. Maurice Leduc, Director, Regulatory Affairs, Nepera, Inc., from Mr. John E. LaPadula, P.E., Chief, New York Remediation Branch, U.S. Environmental Protection Agency, re: Concerns Related to the Nepera Chemical Site, July 1,1998.

8.0 HEALTH ASSESSMENTS

8.1 ATSDR Health Assessments

P. 800001 - 800008 Report: Preliminary Health Assessment, Nepera Chemical Inc., Maybrook, New York, prepared by New York State Department of Health Under Cooperative Agreement with the Agency for Toxic Substances and Disease Registry, June 30, 1989.

P. 800009 - 800019 Report: Site Review and Update, Nepera Chemical Company, Inc., Maybrook, Orange County, New York, prepared by New York State Department of Health Under a Cooperative Agreement with U.S. Department of Health & Human Services, Public Health Service, Agency for Toxic Substances and Disease Registry, revised January 5, 1994.

10.0 PUBLIC PARTICIPATION

10.9 Proposed Plan

P. 10.00001- 10.00016 Report: Superfund Proposed Plan, Nepera Chemical Company, Inc. Superfund Site, Hamptonburgh, Orange County, New York, prepared by U.S. Environmental Protection Agency, July 2007.

P. 10.00017- 10.00017 Letter to Mr. George Pavlou, P.E., Director, Emergency Remedial Response Division, U.S. EPA, Region 2, from Mr. Dale A. Desnoyers, Director, Division of Environmental Remediation, New York State Department of Environmental Conservation, re: Proposed Remedial Action Plan, Nepera Chemical Company, Inc. Superfund NYSDEC Site No. 130073, Hamptonburgh, Orange County, July 2007.

APPENDIX IV

STATE CONCURRENCE LETTER

New York State Department of Environmental Conservation
Division of Environmental Remediation, 12th Floor
625 Broadway, Albany, New York 12233-7011
Phone: (518) 402-9706 • **FAX:** (518) 402-9020
Website: www.dec.ny.gov

Alexander B. Grannis
Commissioner

September 28, 2007

Mr. George Pavlou
Director, Emergency & Remedial Response Division
United States Environmental Protection Agency
Floor 19
290 Broadway
New York, NY 10007-1866

Re: Nepera Maybrook, NYSDEC Site No. 336010
Federal Superfund Identification Number: NY000511451
Record of Decision

Dear Mr. Pavlou:

The New York State Department of Environmental Conservation and the New York State Department of Health have reviewed the above referenced Record of Decision (ROD). The State concurs with the selected remedy as stated in the September 2007 ROD , and as summarized below

- The soil remedy will consist of the excavation of the soil from the six former wastewater lagoons and the treatment of the contaminated soil with soil vapor extraction (SVE) and biological degradation within an engineered below-grade biocell. If necessary, the air removed from the biocell via the SVE will be treated using carbon adsorption prior to being recirculated or exhausted to the atmosphere. It is expected that this remedy will achieve TAGM 4046 and Part 375 soil cleanup objectives as stated in the ROD.

- The groundwater remedy will remediate site groundwater conditions through enhanced in-situ bioremediation of the groundwater contaminants by the indigenous microbial population. The excavated lagoon areas will be treated with oxygenating compounds to create an aerobic environment and stimulate biodegradation of groundwater within the areas of elevated contamination.

- The application of the oxygenating compounds will be followed by a long-term groundwater monitoring program to evaluate the rates of biodegradation and contaminant attenuation and will ensure that this remedy is protective of human health and the environment. It is expected that the groundwater remedy will achieve New York State groundwater standards.

- To enhance aerobic biodegradation outside of the source area, the remedial design will consider location-specific injections of oxygenating compounds at various locations in the groundwater contamination plumes.

- The private supply wells in the vicinity of the site, currently being monitored for site related contaminants, will continue to be sampled periodically as deemed necessary by the NYSDOH.

- The remedy will include institutional controls in the form of an environmental easement/restrictive covenant to be filed in the property records of Orange County to restrict any excavation below the soil surface layer in those areas undergoing remediation, restrict new construction at the site, restrict the use of groundwater as a source of potable or process water, and require that the owner/operator complete and submit periodic certifications that the institutional and engineering controls are in place.

- A Site Management Plan (SMP) will be developed to provide for the proper management of all post-construction site-remedy components, including institutional controls and engineering controls (such as the perimeter fence), identification of site use restrictions, enforcement of the requirements of the easement/covenant, operation and maintenance of the remedy components, and implementation the groundwater monitoring program.

- The institutional controls will continue to apply to the site and the SMP will continue to be implemented until such time as both the site soil cleanup objectives and the groundwater standards are met and discontinuation of the ICs and the SMP is approved by all agencies involved with this project.

If you have any questions, please contact Robert Cozzy at 518-402-9767.

Sincerely,

Dale A. Desnoyers
Director
Division of Environmental Remediaiton

c: M. MacCabe
M. Dannenberg, USEPA

ec: S. Ervolina
R. Cozzy
J. Aversa
R. Schick
R. Pergadia, Region 3
A. Perretta, NYSDOH
M. Rivara, NYSDOH
S. Bates, NYSDOH
G. Litwin, NYSDOH
J. LaPadula, USEPA
A. Carpenter, USEPA

APPENDIX V

RESPONSIVENESS SUMMARY

RESPONSIVENESS SUMMARY

Nepera Chemical Company, Inc, Superfund Site

INTRODUCTION

A responsiveness summary is required by regulations promulgated under the Superfund statute. It provides a summary of citizens' comments and concerns received during the public comment period, as well as the responses of the United States Environmental Protection Agency (EPA) and the New York State Department of Environmental Conservation (NYSDEC) to those comments and concerns. All comments summarized in this document have been considered in EPA and NYSDEC's final decision involving selection of a remedy for the Nepera Chemical Company, Inc. Superfund Site (Site).

SUMMARY OF COMMUNITY RELATIONS ACTIVITES

As lead agency for the Site, EPA has ensured that Site reports have been made available for public review at information repositories at the USEPA Region II Superfund Records Center, 290 Broadway, New York, NY, and the Hamptonburgh Town Hall, 18 Bull Road, Campbell Hall, New York.

The Proposed Remedial Action Plan (or Proposed Plan) was prepared by EPA, with consultation by NYSDEC, and finalized on July 31, 2007. A notice of the Proposed Plan and public comment period was published in the Times Herald-Record on July 31, 2007 consistent with the requirements of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) §300.430(f)(3)(i)(A), and a summary of the Proposed Plan was mailed to all persons on the Site mailing list. On July 31, 2007, the EPA released for public comment the Proposed Plan for the Nepera Chemical Company, Inc. Superfund Site (Site). The Proposed Plan was made available for review at the information repositories for the Site. The public comment period began July 31 and ended on August 29, 2007. During the public comment period, EPA held a public meeting on August 16, 2007 to discuss the Proposed Plan and received comments on it. In addition, EPA received written comments on the Proposed Plan during the public comment period. This document summarizes the comments submitted by the public and EPA's responses.

The comments are grouped into the following categories:

- General questions and comments raised by the public (local residents)
    - Past site history
    - Characterization of contamination
    - Remedy Selection and implementation
    - General Issues
- Comments submitted by the Potentially Responsible Parties

PUBLIC COMMENTS AND EPA'S RESPONSES

General questions and comments raised by the public (local residents)

Past Site History

Comment 1: Regarding Nepera's plant in Harriman, NY, has anyone done anything regarding environmental issues at this Site?

Response 1: NYSDEC issued a Record of Decision for the Harriman Site in 1997. The Harriman plant stopped all operations in May 2005. Since that time, the owner of the facility has performed a Resource Conservation and Recovery Act (RCRA) Facility Investigation and submitted a report to NYSDEC. NYSDEC reviewed the report and, on July 10, 2007, requested that additional information be included in the report and that a Phase II RCRA Facility Investigation be conducted to fully delineate the extent of the mercury contamination at this location. Questions related to the Nepera-Harriman Site may be addressed to Mr. Paul Patel at NYSDEC. He can be reached at (518)402-8602.

Comment 2: How was the wastewater brought to the lagoons?

Response 2: The wastewater was trucked to the Site from the Nepera plant in Harriman, NY from 1953 through 1967.

Comment 3: Wasn't more than one leak detected in the former lagoons?

Response 3: Yes. In the late 1950s and early 1960s, NY State inspectors detected multiple leaks from the lagoons.

Comment 4: On May 11, 1967, New York State found Nepera was operating curtain drains taking surface water out of their lagoons and disposing of it in surrounding areas.

Response 4: Yes, the curtain drain is discussed in the Remedial Investigation (RI) Report (which is in the Administrative Record). A curtain drain is a perforated trench or conduit that intercepts surface or ground water and diverts it elsewhere. As stated in the RI Report, on May 11, 1967, a contractor to Nepera, Inc. was observed in the process of installing a curtain drain in the vicinity of a previously identified wastewater breakout north of the lagoons. As part of the initial evaluation of this Site, NYSDEC requested that Nepera, Inc. perform an investigation of the curtain drain. This investigation was performed on June 29, 1995. Several test pits were excavated to determine the alignment and extent of the curtain drain. In addition, soil samples were collected from the test pits. Analytical results from the investigation showed little evidence of contamination; the concentration of inorganic contaminants (metals) are similar to background concentrations. Only low concentrations of volatile organic compounds (VOCs) and semivolatile organic compounds (SVOCs) were detected. None of the Site-related pyridine compounds were detected in any of the samples from the test pits.

Comment 5: A resident indicated he observed the Site for years and saw individuals in white suits at the Site at 2 o'clock in the morning.

Response 5: Sampling crews have gone onto this Site in white tyvek suits during the daytime. Since the onset of the RI, EPA is not aware of anyone going onto the Site during the night.

Characterization of Contamination

Comment 6: How sure are you that the assessment of the contaminants has been fully investigated?

Response 6: As part of the RI, hundreds of soil and groundwater samples have been taken at the Site. The analytical data from these samples have been evaluated to determine what contaminants are present, and the areal extent of contamination. These sampling activities and analyses were conducted in an iterative fashion whereby the data from one sampling phase were utilized to determine the sampling and analytical requirements for the next phase. Based on a review of the volume of data obtained during the RI, EPA and NYSDEC determined that the investigation had sufficiently characterized the nature and extent of contamination to select a remedy to address this contamination.

Comment 7: Has the range of possible contaminants investigated by EPA or NYSDEC confirmed the range of contaminants that resulted in the property's designation as a Superfund Site?

Response 7: Yes. The data from the initial investigations have been confirmed by data collected during the RI.

Comment 8: One resident claimed the chemicals from the Site are in his private water well and as a result, is not used for drinking water.

Response 8: Nepera, Inc. and the New York State Department of Health (NYSDOH) have been collecting samples from private wells for several years. Analytical data from the samples taken from your well indicate that contaminants associated with the Site have never been detected in your private well.

Comment 9: When was the last groundwater testing of private wells done?

Response 9: The last round of groundwater testing was performed in June 2007.

Comment 10: How far away from the Site are the private wells that you are monitoring for Site-related contaminants?

Response 10: The private wells that are being sampled are approximately 175 feet and 200 feet from the northern property boundary and 250 feet from the west-southwest property boundary.

Comment 11: This area where the Site is located sits on some of the largest water reserves in the county. Has the groundwater contamination been detected in the overburden or is it farther down?

Response 11: Contamination has been detected in the overburden aquifer and the underlying bedrock aquifer. Groundwater contamination above health-based standards has largely remained within the Site-property boundary. An ongoing groundwater monitoring program will continue to be performed to evaluate the effectiveness of the selected remedy and to ensure that no private wells are impacted by Site-related contaminants.

Comment 12: Where have the 255 million gallons of highly toxic wastewater which were disposed of in the former lagoons gone?

Response 12: The lagoons were lined and were meant to function as evaporation lagoons. As such, much of the estimated 255 million gallons of waste liquids disposed of in the lagoons likely would have evaporated while the lagoons were still in operation. Some of the wastewater likely seeped through the soil into the aquifer.

Comment 13: What area of soil contamination has occurred?

Response 13: The soil contamination is predominantly restricted to the original area of the constructed lagoons, which is less than 5 acres.

Comment 14: What effect has this Site had over the years on wildlife?

Response 14: No specific study was performed to determine what wildlife were impacted over the years. However, an Ecological Risk Assessment was conducted based on current Site conditions and concluded that contaminants are found in groundwater and soils, but are not present at levels posing significant risks to ecological receptors. As discussed in EPA's Proposed Plan, the potential for risk to ecological receptors exposed to Site-related contaminants was limited to isolated locations, primarily in lagoon 6, and the risk associated with this area used the conservative assumption that the ecological receptors (animals) spend 100% of their lives in this very limited area of Lagoon 6. The contaminants outside of Lagoon 6 were determined not to pose a potential for adverse ecological effects because they were common elements of soil that were not related to Site operations. The detected concentrations were comparable to background levels and the frequency of detections was low. Therefore, no adverse impacts to wildlife are expected.

Comment 15: Has there been a survey of the tributaries in the vicinity of the Site?

Response 15: Yes. Surface water was sampled in 1991 and 1995. Samples were collected from Beaverdam Brook from locations upstream, adjacent to, and downstream of the Site. Furthermore, surface water was also collected from Otter Kill which is downstream of the Site and into which Beaverdam Brook flows. In general, the surface water quality data indicate that the Site has no measurable impact on contaminant concentrations in Otter Kill and Beaverdam Brook. Comparable concentrations of organics and inorganics were reported at both upstream and downstream sampling locations. Sediment samples were also collected from Beaverdam Brook (upstream, adjacent to, and downstream from the Site) in 1991, 1995, and 2003. Numerous semi-volatile organic compounds (primarily polyaromatic hydrocarbons, which are not considered Site-related) and several pesticides (also, not considered Site-related) were detected at levels exceeding criteria values.

Comment 16: There was significant flooding in May of 2007. Is there any concern about the surface water runoff from the Site?

Response 16: Soil sampling activities have indicated that the surface soil is not contaminated. The contamination is found at depth, in the subsurface soil.

Remedy Selection and Implementation

Comment 17: Is there a program that will test my well system for the contaminants known to exist at the Site?

Response 17: There is an ongoing program performed by the potentially responsible parties (PRPs), under the direction of the NYSDOH, to monitor private wells in the immediate vicinity of the Site. A review of the monitoring program will be conducted during the Remedial Design.

Comment 18: Under the proposed soil remedy (Alternative S4), you can't guarantee the air quality.

Response 18: A community health and safety plan will be prepared to ensure that the construction activities do not cause the spread of contamination. Precautions will be taken to prevent contaminants from becoming airborne. These precautions may include wetting down the soil, putting up curtains to prevent contaminants from spreading, and use of air monitoring devices at the perimeters of the work site to ensure that contaminants are not leaving the work area.

Comment 19: The groundwater remedy Alternative GW3 would guarantee the integrity of the aquifers, but the alternative proposed by EPA (Alternative GW2) would not. It would not guarantee that the contaminants in the future would not move off-Site.

Response 19: While there are no absolute guarantees with respect to any remedy, all of the remedial alternatives for groundwater were assessed for their ability to restore the groundwater to drinking water quality. Groundwater Alternative GW-3 involves a groundwater pump-and-treat system which would contain the migration of contamination in the groundwater within the Site property but the Agency believed this alternative did not provide the best balance of tradeoffs among all the alternatives with respect to the evaluation criteria. The effectiveness of the selected remedy will be assessed in Five-Year reviews (the first review will be due five years after the initiation of construction of the remedy) to ensure that the remedy is protective of human health and the environment and aquifer restoration is occurring.

Comment 20: Even though the soil remedy referred to as Alternative S6, which involves excavating all contaminated soils and removing them for disposal elsewhere, is the most expensive, it guarantees that the Site is a hundred percent clean.

Response 20: The Superfund Act requires EPA to consider nine criteria including cost when selecting a remedy. EPA did not select Alternative S6, which was the most costly alternative to address contaminated soils, because the Agency believed this alternative did not provide the best balance of tradeoffs among all the alternatives with respect to the evaluation criteria.

Comment 21: Who will monitor the Site? Where will the samples be shipped? Who will handle the samples? Who will prepare the monitoring reports?

Response 21: It is anticipated that the PRPs will be responsible for monitoring, under EPA's direction and oversight, pursuant to either a judicial Consent Decree or an EPA administrative order to implement the selected remedy. A comprehensive monitoring plan (which will include soil and groundwater monitoring) will be developed during the Remedial Design. The PRPs will hire a contractor to perform the monitoring. The samples collected will be properly packaged (e.g., put onto ice in a cooler) and shipped off to a certified laboratory for analysis. Chain-of-Custody will be maintained for each sample, from the time the sample is collected through analysis of the sample by the laboratory. EPA will review and approve the sampling and analytical protocol. In addition, EPA will take split-samples (duplicate samples) to verify the analytical data. Reports which will include monitoring data will be compiled by the PRPs and submitted to EPA and will be available for public review.

Comment 22: A resident recommended installing a 360 cap over the area, grading the area to promote runoff, and operating a groundwater pump and treat system.

Response 22: These measures were evaluated in the Feasibility Study and the Proposed Plan. EPA did not select the capping alternative because under this alternative, the contaminated soils would remain on-Site untreated and the Superfund statute has a preference for treatment. The pump-and-treat system was not selected as explained in the response to Comment 19.

Comment 23: A concern was expressed regarding the high volume of traffic that would be created if the remedy called for excavation of contaminated soils with off-Site disposal.

Response 23: EPA did not select this alternative.

Comment 24: What assurances are there that whatever treatment alternative is selected, the water on my property will be okay?

Response 24: Groundwater samples will continue to be collected at monitoring wells on the Site and from private wells in the immediate vicinity of the Site to ensure that no private wells are impacted by Site-related contaminants.

Comment 25: In order to protect the health of the community, Site contamination should be removed.

Response 25: The groundwater will be treated with oxygenating compounds (e.g., oxygen-releasing compounds) to facilitate bioremediation. The soil contamination will be treated to levels that are protective of human health and the environment. EPA did not select the alternative which included excavation and off-site disposal of contaminated soils as explained in the response to Comment 20.

Comment 26: How far down are you planning to excavate the soil?

Response 26: Under the proposed soil remedy, all of the contaminated soil in the lagoon area will be excavated down to the bedrock, which is located about 14 feet below the ground surface.

Comment 27: Is there any guarantee that the municipal wells owned by the Village of Maybrook or private wells in the Town of Hamptonburgh will not be affected by contamination at the Site?

Response 27: The Village of Maybrook has public supply wells located near the Site. These wells are analyzed on a quarterly basis for Site-related contaminants, none of which have ever been detected. In the event that monitoring should indicate that the Village of Maybrook public water supply wells have been impacted by the Site-related contaminants above health-based levels, a contingency plan would be necessary to provide for a wellhead treatment for the Village of Maybrook wells on an interim basis pending further consideration of groundwater treatment alternatives to meet groundwater treatment standards. In addition, a groundwater monitoring program will continue to be performed to evaluate the effectiveness of the selected remedy and to ensure that no private wells are impacted by Site-related contaminants. Also see response to Comment 24, above.

Comment 28: What effects will the cleanup have on the deeply imbedded toxic soils?

Response 28: The proposed remedy involves the excavation of all the soil in the area of the former lagoons down to bedrock. As such, any "deeply imbedded" soils will be excavated and treated.

Comment 29: One resident was concerned with how the remediation will affect the aquifer in the long term.

Response 29: The objective of the remediation is to restore the aquifer to drinking water quality. The contamination has existed at this Site for several decades. Both the overburden and bedrock aquifers have been impacted. Implementation of the soil remedy will remove the source of ongoing groundwater contamination. Implementation of the groundwater remedy will further reduce the levels of contaminants in both aquifers.

Comment 30: If Nepera is producing the groundwater monitoring reports, how can you be sure that the reports do not hide the most contentious information?

Response 30: Concealing or falsifying data would be a criminal act. Groundwater monitoring has been conducted with EPA and/or New York State oversight in accordance with standard chain-of-custody procedures, beginning with the collection of samples and carrying through to receipt and analysisby the laboratory. In addition, EPA reserves the right to analyze split samples for a certain percentage of the environmental samples taken by the PRPs for independent verification of the PRPs' sampling and analytical programs.

Comment 31: If the remedy involves excavating contaminated soil, what is the likelihood that the contaminants will become airborne? My house is located about 500 feet from the Site.

Response 31: Implementation of the remedy would involve using certain protocols to ensure that contaminants would not spread. The protocols may involve wetting-down the soils and/or installing curtains around the excavation area. Also, air monitoring would be performed at the perimeter to ensure contaminants do not migrate beyond the property.

Comment 32: For how long will monitoring be performed after the remedies are implemented?

Response 32: Monitoring (of air, groundwater, and soil) would be performed as appropriate throughout the remedy implementation process. Soil sampling would be performed periodically until cleanup objectives are achieved. Once soil cleanup objectives are achieved no further sampling would be required. Groundwater monitoring would be performed until the aquifers were returned to drinking water quality. Several rounds of groundwater sampling would be conducted over a period of time (e.g., one year) to ensure that drinking water standards continue to be met.

Comment 33: What if the remedy doesn't work?

Response 33: The soil and groundwater remedies are expected to be effective in addressing Site contamination. If they are not, other remedial alternatives would be evaluated.

Comment 34: Are the Site-related chemical contaminants biodegradable?

Response 34: Yes, the Site-related contaminants are, under suitable conditions, biodegradable. EPA personnel performed an extensive literature search to assess the potential effectiveness of the use of oxygenating compounds for bioremediation of compounds found in groundwater at the Site, especially the BTEX compounds (benzene, toluene, ethylbenzene, and xylenes). This literature search included reviewing federal documents (including EPA, DOD, and Federal Remedial Technologies Roundtable literature), scientific studies, case studies, and proprietary information dealing with the topic of the use of oxygenating compounds on sites with groundwater contaminated with BTEX compounds.

Often, groundwater contamination is difficult to address because of the heterogeneity of the subsurface, often due to diverse types of materials (e.g., sand, silt, rocks, gravel, etc.) as well as fractures and fissures through which groundwater flows. This heterogeneity can impact how groundwater flows through a contaminated site as well as how the contaminants themselves are dispersed. Furthermore, more traditional methods of treating groundwater (e.g., pump-and-treat technologies) are often very costly because of long cleanup times associated with these operations, and inefficiencies in removing the contaminants from the subsurface. As such, many alternative technologies have been considered and employed in recent years to remediate sites contaminated with organic contaminants, including BTEX. These alternative technologies include a variety of chemical, biological, and physical processes.

In Situ bioremediation relies on microorganisms living in the subsurface to biologically degrade groundwater contaminants. This is called biodegradation. Biodegradation of organic compounds occurs under aerobic and anaerobic conditions. The majority of bioremediation systems are designed to treat contaminants aerobically. Aerobic processes use oxidation to degrade organic compounds to less toxic compounds such as carbon dioxide and water. A typical aerobic bioremediation system involves stimulating native microorganisms by adding nutrients and oxygen. The use of oxygenating compounds has been used extensively to stimulate bioremediation in contaminated groundwater (and soil) at many sites. Oxygenating compounds (such as Oxygen Releasing Compound® or "ORC®") have been used at thousands of contaminated sites, including many sites impacted with petroleum-based fuels and fuel constituents including the BTEX chemicals. The purpose of using an oxygenating compound such as ORC® is to supply a controlled release of oxygen to accelerate the degradation of contaminants in contaminated groundwater or soil. This is accomplished by creating aerobic conditions in the contaminated media, enabling the naturally occurring bacteria/microorganisms to proliferate and consume the contamination. The microorganisms use the contaminants as a source of food.

A large advantage of bioremediation is that it is a remedy where the contaminated groundwater can be treated in place, using naturally occurring microorganisms, without the need to bring the contaminated groundwater to the surface. Bioremediation technologies have been employed to remediate organic contaminants in groundwater (as well as soil) at numerous Superfund sites. The use of oxygenating compounds has been used to stimulate aerobic biodegradation at a number of other cleanup sites, including sites contaminated by spilled fuel and leaking Underground Storage Tanks.

Based on this review, EPA determined that bioremediation should be an effective alternative treatment technology to treat numerous organic compounds, including BTEX, present in the groundwater at the Site. Pyridine biodegrades naturally in water or soil. EPA determined that bioremediation was appropriate and would likely stimulate subsequent biodegradation of BTEX compounds and reduce the period of time which will be necessary for groundwater standards to be attained.

A partial list of the references used in this review is included below.

References:
1. Use of Bioremediation at Superfund Sites, U.S.EPA, Solid Waste and Emergency Response, EPA 542-R-01-019, September 2001, clu-in.org;
2. Abstracts of Remediation Case Studies, Volume 5, Federal Remediation Technologies Roundtable, Prepared by the Member Agencies of the Federal Remediation Technologies Roundtable, EPA 542-R-01-008, May 2001;

3. Brookhaven National Laboratory Five year Review Report, Brookhaven National Laboratory-Operable Unit IV Superfund Site, Prepared by Environmental Restoration Brookhaven National Laboratory, Upton, New York, August 29, 2003;
4. Massachussets Institute of Technology Lecture Series, http://ocw.mit.edu/NR/rdonlyres/Civil-and-Environmental-Engineering/;
5. Environmental Protection, Pollution and Waste Treatment Solutions For Environmental Professionals, June 2007 Issue, pgs. 36 - 39, www.epoline.com;
6. Groundwater Contamination - DOD Uses and Develops a Range of Remediation Technologies to Clean Up Military Sites, U.S. Government Accountability Office, Report to Congress, GAO-55-666, June 2005;
7. In Situ Bioremediation of Petroleum Aromatic Hydrocarbons, by J.Steven Brauner & Marc Killingstad, Groundwater Pollution Primer, CE4594: Soil and Groundwater Pollution, Civil Engineering Dept., Virginia Tech, Fall of 1996;
8. ORC Technical Bulletins, Regenesis Corp., http://www.regensis.com/.

General Issues

Comment 35: Was there any responsibility by the sellers or the realty company to inform me of the proximity of the residence to the Superfund Site when I purchased the house a year ago?

Response 35: There are no federal disclosure laws pertaining to the sale of residential property. New York State, however, does have a property disclosure law. This law requires that the seller disclose conditions concerning conditions regarding the residential real property itself.

Comment 36: My concern is that even after you address the contamination, how am I going to be able to sell my property?

Response 36: EPA's authority pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act ("CERCLA" or commonly referred to as "Superfund") does not extend to private claims for personal injury or property damage. EPA cannot give legal advice with respect to private claims which can only be addressed with private legal counsel.

Comment 37: On what census was the population of 6,500 based?

Response 37: The Proposed Plan noted that approximately 7,000 people live within three miles of the Site. According to the U.S. Census Bureau's Census 2000 Summary, there were 4,686 people and 1,532 households residing in the Town of Hamptonburgh. Furthermore, according to the Census 2000 Summary, there were 3,084 people and 1,077 households residing in the Village of Maybrook. This information is posted on the U.S. Census Bureau's website at http://www.census.gov/census2000/states/ny.html.

Comment 38: What are the long-term plans for this property?

Response 38: EPA does not determine land-use or zoning requirements for Site properties, that is a local governmental function. The property is currently zoned as residential/agricultural. As a result, EPA determined that a residential use was a reasonably anticipated future use for the Site property. The cleanup objectives were developed on the basis of a residential use of the property, which typically results in the most stringent cleanup levels. If there were no restriction on usage, the property owner, Nepera, Inc., ultimately would determine the long-term property usage consistent with local land-use and zoning requirements.

Comments Submitted by the Potentially Responsible Parties

Comment 39: As stated in the PRAP (the Proposed Plan), PRGs (Preliminary Remediation Goals) are developed from the list of Chemicals of Concern (COC) identified in the RI. Section 10.2 of the final RI provides a list of soil clean-up objectives and groundwater cleanup levels and states:

"…Final remedial goals for the Site will be based on the remedy selected and the future land use of the Site. Following the approval of the Site-related COC and their PRGs by the USEPA and NYSDEC, the PRGs will then be used to evaluate each remedial alternative during the FS. The retained organic COC and their respective PRGs will then be used in the development of the Preliminary Remedial Action Plan (PRAP) and the Record of Decision (ROD)…."

The RI discussed applicable or relevant and appropriate requirements (ARARs) to be used which resulted in soil cleanup objectives that are protective of ground water based on NYSDEC TAGM #4046 and other NYSDEC evaluations. This is the basis for the evaluation in the FS. However, in the PRAP, the USEPA departed from this previously approved basis as developed under the RIFS and used criteria based on NYS Brownfields regulations. Under the Brownfields criteria, soil standards vary from those used in the FS and an additional cleanup standard for groundwater Tentatively Identified Compounds (TICs) has been incorporated in the PRAP. However, the PRPs and the regulatory authorities had already agreed to the soil standards to be used in the RIFS process and specifically agreed to address TICs as a soil standard protective of groundwater. Changing the PRGs after completion of the approved RIFS process is inconsistent with the Superfund process. Therefore, we respectfully request that the USEPA correct the PRAP to accurately reflect the approved cleanup criteria and PRGs that were used in the RIFS process.

Response 39: This was, indeed, an example of a long RI/FS process. PRGs were used during the RI/FS process based on information, guidance, and standards that were applicable at that time. Prior to EPA's issuance of the Proposed Plan, the State of New York enacted its Environmental Remediation Programs Regulation 6NYCRR Part 375 (effective on December 14, 2006). The NCP requires that the Applicable or Relevant and Appropriate Requirements (ARARs) or To Be Considered values (TBC) in effect at the time of the issuance of the ROD be used. Furthermore, the remedial action objectives are unaffected by this change and the limited changes in the PRGs have no impact to the implementation of the overall remedy.

Comment 40: As mentioned above, the USEPA has introduced the use of Brownfields requirements under NYSDEC Subpart 375 as part of the PRGs in the PRAP. However, this potential ARAR was never evaluated during the FS and should not be applied to the Site. The ARARs adopted in the RIFS, which do not include this new potential ARAR under Brownfields, are conservatively protective of Human, Health and the Environment. Therefore, the Brownfields ARAR should not be included in the ROD.

If the USEPA desires to apply Brownfields requirements to the Site then an accurate assessment of the past, current, and future use of the Site needs to be discussed in the context of Brownfields development. The Site is an inactive hazardous waste Site that was utilized for industrial purposes. It is the intent of the land owner to create open space and park land for the Site. We request that USEPA include in the ROD the necessary provisions according to Superfund guidance to allow the cleanup to proceed for the Site beneficial use as open space and park land.

Response 40: EPA uses the PRGs in the PRAP appropriately as explained in the response to Comment 39. The Site is not a Brownfields Site; it is a Superfund Site on the National Priorities List. The Site property is currently zoned for residential/agricultural use, and, as such, residential use is a reasonably anticipated future use of the Site.

Comment 41: The referenced remedy is incorrectly described in the PRAP. Within the GW2 remedy detailed in the FS and further clarified in Attachment A of the cover letter transmitting the final FS to USEPA, the enhancement of monitored natural attenuation (MNA) by application of oxygen releasing compound (ORC®) is further detailed and states:

"…the need and design details of ORC injection is best addressed in the RD if groundwater Alternative #2 is selected in the ROD. Integral to the RD will be the (performance monitoring program) PMP that will specify monitoring of groundwater conditions immediately during and after the implementation of a SVE/biocell. A PMP would be implemented to permit further evaluation of COC and oxidation-reduction potential (ORP) indicator trends after remediation of the lagoon area soils. The details will also include the monitoring well network, analytical parameters, the frequency of sampling, and the need for ORC® applications. Depending on the results of ground water sampling, ORC® applications may not be required…"

We believe the reference to GW2 as enhanced bioremediation is incorrect and more accurately reflects a hybrid remedy similar to GW4 which is based on ORC® treatments. Therefore, we request that USEPA correct the PRAP with respect to the foregoing to more accurately depict the selected remedy of GW2-Enhanced Monitored Natural Attenuation as specified in the FS and our clarifications to the FS.

Response 41: Alternative GW-2, as expressed in the Proposed Plan, is depicted somewhat differently than Alternative GW2 was expressed in the Feasibility Study Report. The primary distinction is that Alternative 2 as presented in the Proposed Plan would apply oxygenating compounds into the excavated areas of the former lagoons to immediately influence the biodegradation in the aquifers. The Feasibility Study Report, though considering the exact same action, determined that the need and design details of application of oxygenating compounds is best addressed in the Remedial Design.

Monitored Natural Attenuation (MNA) can be a valid control strategy for managing risks from contaminated groundwater where hydrogeological conditions indicate that the contaminants are conducive to degradation. EPA's guidance indicates that for MNA to be selected, a proposal for MNA must include clear evidence demonstrating that degradation of contaminants is occurring, groundwater conditions are amenable (and will remain amenable) for MNA to occur, and that remedial goals are capable of being met in an adequate time frame. There is currently no clear evidence that degradation of contaminants is occurring or that groundwater conditions are currently amenable for MNA to occur. As such, MNA is not an appropriate remedy for the Site. EPA expects that GW-2 will affect current groundwater conditions beneficially so that, after the application of oxygenating compounds (for example, ORCs®), groundwater conditions would be amenable to biodegradation of contaminants. EPA's expectations will be verified through long-term groundwater monitoring. The reference to GW-2 as "Enhanced Bioremediation with Long-Term Groundwater Monitoring," therefore, more accurately depicts the intention to remediate groundwater emanating from the former lagoon area.

Comment 42: The approved FS was based on the point of compliance for groundwater being at the edge of the waste management unit - the biocell. As noted by USEPA, this is consistent with federal Superfund guidance. We believe the PRAP incorrectly implies that all of the groundwater beneath the Site must meet the PRGs. We respectfully request that USEPA correct the PRAP to indicate that the point of compliance for groundwater is the edge of the biocell consistent with the FS and Superfund guidance.

Response 42: EPA indicates in the PRAP that all of the groundwater beneath the Site must meet the PRGs. The implication that the biocell is a waste management unit, as defined in EPA literature, is incorrect. The biocell is a temporary treatment unit. As such, final cleanup levels for contaminated groundwater should be attained throughout the entire contaminant plume, as the goal of the remedy is to return the aquifer to drinking water standards. The expectation is that the entire excavated area of the former lagoons will be treated with oxygenating compounds prior to backfilling and construction of the biocell.

Comment 43: A principle objective for the Site is the protection of potable water supplies. While there are no current impacts and implementation of the remedial actions will further ensure against any impacts in the future, we expected the PRAP to discuss a contingency in the event that potable water wells are impacted above drinking water standards. We would expect a contingency to be included in the ROD for well head treatment in the event of this highly unlikely possibility.

Response 43: In the event that monitoring should indicate that the Village of Maybrook public water supply wells have been impacted by the Site-related contaminants above health-based levels, a contingency plan is necessary to provide for a wellhead treatment for the Village of Maybrook wells on an interim basis pending further consideration of groundwater treatment alternatives to meet groundwater treatment standards.

Comment 44: In discussing the costs for remedial alternatives evaluated in the FS, the USEPA did not reference the range of costs from the FS, rather the maximum costs for each alternative was presented in the PRAP. We believe this is misleading as the cost ranges reflect both the cost uncertainty and options within the design of those remedies. We respectfully request that USEPA correct the PRAP to more accurately reflect the range of costs used in the FS evaluations.

Response 44: Cost information was provided in the Feasibility Study Report for the remedial alternatives presented in the PRAP. As noted in this comment, the FS Report provided a range of costs for each alternative. The EPA presented the maximum cost in the range as a conservative estimate of remedy costs. For further information on these ranges of costs, we direct attention to the FS Report which is in the Administrative Record.

Comment 45: Warner Lambert respectfully requests confirmation of the following:

1. The PRG for pyridine-related TICs was developed using the guidance from 6NYCRR §702.15.
2. The PRG is a guidance value that applies to each individual pyridine-related TIC.
3. The application of the "general organic guidance value" is consistent with the guidance provided in the Technical and Operational Guidance Series (TOGS) 1.1.1 - Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations.

Response 45: The PRG for pyridine-related TICs (tentatively identified compounds) were developed by NYSDEC, using the methodology which is described in NYSDEC's letter, dated August 14, 1996 which is in the Administrative Record.

Comment 46: Regarding the perimeter fence, it should be noted that the fence may be removed after remediation of soils and when an adequate vegetative cover is established within the lagoon area.

Response 46: The perimeter fence may be removed once soil cleanup objectives are achieved at the Site.

Comment 47: Besides cost, other issues related to off-Site disposal were presented in the FS. For example, off-Site disposal in a permitted landfill does not reduce the toxicity of contaminants and may present a future contingent liability to the PRPs. Consistent with the National Contingency Plan (NCP), the national goal of remedy selection is to select a remedy that is protective of human health and the environment, maintains protection over time, and minimizes untreated waste. Clearly, Soil Alternative S4 fulfills all three goals, whereas off-Site disposal (Soil Alternative S6) leaves the waste material untreated and partially achieves the goals of the NCP.

Response 47: The EPA conducts a detailed analysis of the remedial alternatives against nine evaluation criteria and a comparative analysis focusing upon the relative performance of each alternative against those criteria. The nine criteria are: overall protection of human health and the environment; compliance with applicable or relevant and appropriate requirements; long-term effectiveness and permanence; reduction of toxicity, mobility, or volume through treatment; short-term effectiveness; implementability; cost; state acceptance; and community acceptance. In consideration of these nine criteria, Alternative S4 represented the best balance for these criteria among the alternatives considered and was selected as the preferred remedy.

Comment 48: There is increasing support for the inclusion of sustainable development principles when selecting a remediation technology. We believe Soil Alternative S4 will result in much lower energy consumption and greenhouse gases than Soil Alternative S6, i.e., lower carbon dioxide footprint. The lower carbon dioxide footprint is a direct result from the elimination of transportation vehicles and landfill equipment.

Response 48: Sustainable development principles are not one of the nine evaluation criteria assessed when selecting a remedial alternative. That being said, it seems correct that Soil Alternative S4 would result in lower energy consumption and greenhouse gases than Soil Alternative S6.

Comment 49: Regarding Groundwater Alternative GW-2 (Enhanced Bioremediation), we question whether USEPA's reluctance to call the alternative MNA is driven by OSWER Directive Number 9200.4-17P (USEPA 1999). We respectfully request that the USEPA confirm that the monitoring goal of Groundwater Alternative GW-2 is consistent with the overall objectives of MNA.

Response 49: The goal of the Groundwater Alternative GW-2 is to create aerobic conditions in the groundwater to stimulate biodegradation of the contaminants. Alternative GW-2 also includes a long-term groundwater monitoring program which would monitor the levels of certain natural parameters and the contaminants in the groundwater and determine whether the contaminants are naturally attenuating. In this respect, the monitoring goal of Groundwater Alternative GW-2 is consistent with the overall objectives of MNA.

Comment 50: USEPA also mentions that ORC may need to be applied on multiple occasions. This comment presumes the need, injection location, and frequency of ORC® injection without taking into account the exact groundwater conditions outside the source area of soil contamination…. The need and design details of ORC® injection are best addressed in the RD as suggested in the (Proposed) Plan.

Response 50: Oxygenating compounds (for example, ORCs®) will be applied in the areas of the excavated former lagoons. The need and design details of additional ORC® injection (or the injection of any oxygenating compound) will be addressed in the Remedial Design.

Comment 51: "The main assumption using ORC® after excavation is that dissolved oxygen is the limiting groundwater component in the aerobic bioremediation equation. However, the results from the Performance Monitoring Program will indicate the need for ORC® after lagoon soils are excavated from the base and sidewalls of the lagoon area to meet the PRGs for soil. During construction of the biocell, the excavation area will be dewatered. It is anticipated that the aerobic environment may be restored to localized groundwater, hence, negating the need for ORC®."

Response 51: As explained in the response to Comment 50, oxygenating compounds will be applied in the excavated areas of the former lagoons. Currently, conditions in the subsurface and groundwater beneath the former lagoon area are largely anaerobic. Aerobic conditions would be more conducive than anaerobic conditions for significant biodegradation of the Site-related contaminants to occur. As such, the ROD calls for the application of oxygenating compounds (such as ORC®) into the excavated area to create the necessary aerobic conditions for this biodegradation to occur. The oxygenating compound(s) would be applied and would subsequently spread downward, further into the bedrock aquifer, and spread radially outward in both aquifers, spreading in both directions of groundwater flow. Finally, the need for injection of oxygenating compounds into strategically placed injection wells to supplement the application in the excavated area will be assessed in the Remedial Design.

RESPONSIVENESS SUMMARY

APPENDIX V-a

JULY 2007 PROPOSED PLAN

Superfund Proposed Plan

Nepera Chemical Company, Inc. Superfund Site

Hamptonburgh, Orange County, New York

EPA

July 2007

PURPOSE OF THE PROPOSED PLAN

This Proposed Plan describes the remedial alternatives considered for the contaminated soil and groundwater at the Nepera Chemical Company Superfund Site, and identifies the preferred remedy with the rationale for this preference. This Proposed Plan was developed by the U.S. Environmental Protection Agency (EPA) in consultation with the New York State Department of Environmental Conservation (NYSDEC).

EPA is issuing this Proposed Plan as part of its public participation responsibilities under Section 117(a) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended (commonly known as the federal "Superfund" law), and Sections 300.430(f) and 300.435(c) of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). The nature and extent of the contamination at the site and the alternatives summarized in this Proposed Plan are further described in the June 16, 2006 Remedial Investigation (RI) Report and the June 26, 2007 Feasibility Study (FS) Report, respectively. EPA and NYSDEC encourage the public to review these documents to gain a more comprehensive understanding of the site and Superfund activities that have been conducted at the site.

This Proposed Plan is being provided to inform the public of EPA's preferred remedy and to solicit public comments pertaining to the remedial alternatives evaluated, including the preferred alternatives. EPA's preferred remedy consists of the following components:

> Excavation of the soil in the source area (former lagoon area), the design and construction of a biocell to contain the excavated soil, the installation of a soil vapor extraction (SVE) system within the biocell, and operation of the SVE and biocell to remediate contaminated soil. This soil remedial alternative is referred to as Soil Alternative 4 (S4). In addition, the excavated area will be treated with oxygenating compounds (e.g., Oxygen Releasing Compounds) to create an aerobic environment and, thereby, stimulate biodegradation within the area of elevated groundwater contamination. This groundwater remedial alternative is referred to as Groundwater Alternative 2 (GW2). The injection of oxygenating compounds directly into the groundwater at location-specific injection points to further enhance biodegradation of groundwater contamination will be evaluated during the remedial design. This will be followed by a long-term groundwater monitoring program where groundwater samples

Mark Your Calendar

July 31, 2007 – August 29, 2007: Public Comment Period on the Proposed Plan.

August 16, 2007 at 7:00 p.m.: The U.S. EPA will hold a Public Meeting to explain the Proposed Plan. The meeting will be held at Campbell Hall in Hamptonburgh, New York.

For more information, see the Administrative Record file (which will include the Proposed Plan and supporting documents), which is available at the following locations:

Hamptonburgh Town Hall
18 Bull Road
Campbell Hall, New York 10916
Tel. 845-427-2424
Hours: Monday - Friday 9:00am - 3:30pm

and

USEPA-Region II
Superfund Records Center
290 Broadway, 18th Floor
New York, NY 10007-1866
(212) 637-4308
Hours: Monday-Friday, 9:00 a.m. - 5:00 p.m.

Written comments on this Proposed Plan should be addressed to:

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The EPA has a web page for the Nepera Chemical Company Site at www.epa.gov/region2/superfund/npl/neperachemical .

would be collected and analyzed regularly in order to verify that the concentrations and the extent of groundwater contaminants are declining. The exact frequency and parameters of sampling and location of any additional monitoring wells would be determined during the design phase.

The remedy described in this Proposed Plan is the preferred remedy for the site. Changes to the preferred remedy or a change from the preferred remedy to another remedy may be made if public comments or additional data indicate that such a change will result in a more appropriate remedial action. The final decision regarding the selected remedy will be made after EPA has taken into consideration all public comments. EPA is soliciting public comment on all of the alternatives considered in this Proposed Plan.

COMMUNITY ROLE IN SELECTION PROCESS

EPA and NYSDEC rely on public input to ensure that the concerns of the community are considered in selecting an effective remedy for each Superfund site. To this end, this Proposed Plan, along with the supporting Remedial Investigation and Feasibility Study Reports, have been made available to the public for a public comment period which begins on **July 31, 2007** and concludes on **August 29, 2007**.

A public meeting will be held during the public comment period at Campbell Hall in Hamptonburgh, New York on **August 16, 2007** at 7:00 P.M. to elaborate on the reasons for the proposed remedy and to receive public comments.

Comments received at the public meeting, as well as written comments, will be documented in the Responsiveness Summary Section of the Record of Decision (ROD), the document which formalizes the selection of the remedy.

SCOPE AND ROLE OF ACTION

This Proposed Plan presents the preferred alternatives to remediate the site. The objectives of the proposed remedy are to remediate contaminated soil, reduce and minimize the migration of contaminants in the groundwater, restore groundwater quality, and minimize any potential future health and environmental impacts.

SITE BACKGROUND

Site Description

The property is located on the south side of Orange County Highway 4 in Hamptonburgh, Orange County, New York, approximately 1.5 miles southwest of the Village of Maybrook (see Figure 1). The site is owned by Nepera Chemical Company, Inc. (Nepera). The site is 29.3 acres in area; approximately 5 acres of the site were used for the historical lagoon operations (see Figure 2). The site is located in a rural residential/agricultural area, bounded by Orange County Highway 4 to the north, Beaverdam Brook to the west, the Otter Kill to the south, and an undeveloped tract of land to the east. Three residences exist in the immediate vicinity of the site, one to the southwest, one to the north and one to the northeast (on the other side of Orange County Highway 4).

Approximately 7,000 people live within three miles of the site, with the closest residences located approximately 250 feet to the west-southwest and 175 feet to the northeast. The public water supply wells for the Village of Maybrook are located approximately 800 feet to the northeast of the site property. All residences in the vicinity of the site rely on private wells for the potable water supply.

Site Geology/Hydrogeology

The site is in an area of rolling hill topography and is located within a 4.5 square mile watershed consisting of Beaverdam Brook and its tributaries, which discharge to the Otter Kill, located approximately 500 feet to the south of the property. The geologic units at the site are divided into two primary units, the overburden (comprised of topsoil, fill, and gravel) and the bedrock (comprised of shale). Ground surface topography is generally bedrock controlled in that the ground surface generally follows the bedrock surface topography. The overburden thickness at the site is also related to bedrock topography in that it is generally thinner (or absent) over bedrock ridges, while greater overburden thicknesses have been deposited in bedrock depressions and valleys. The overburden ranges in thickness from 0 to 20 feet.

Most of the site is forested. The former lagoon area, which was stripped of vegetation while in use, is now covered with grasses, wild flowers, and mixed brush. There are two aquifers that exist beneath the site, the overburden aquifer and the bedrock aquifer. The overburden aquifer is the surficial unit which overlies the bedrock aquifer. The bedrock aquifer is the primary source for public water in the area. No significant layers of impeding clays were observed between the two aquifers within the study area. An east to west trending groundwater divide is present in the bedrock aquifer underlying (and transecting) the lagoon area. As such, groundwater flow has a northerly and a southerly component radiating from this divide.

Site History

The site was used for the disposal of industrial wastewater generated at the Nepera Chemical Company facility in Harriman, New York, located approximately 25 miles from the site. Wastewater was trucked to the site and disposed of in six constructed lagoons from 1953 through December 1967. Approximately 5 acres of the site were used for the historical lagoon operations, six lagoons in all. No wastewater disposal has occurred at the Site since December 1967. Three of the lagoons were backfilled with clean soil in 1968 and the remaining three lagoons were backfilled with clean soil in 1974.

Beginning in 1967, numerous investigations were conducted by various consultants to Nepera to determine the extent of contamination at the site. Based on the results of these investigations, NYSDEC placed the site on the New York Registry of Inactive Hazardous Waste Disposal Sites. On August 17, 1984, the State of New York entered into a Consent Decree with Nepera Chemical Company, Inc. to conduct a remedial investigation to determine the type and extent of contamination at the site.

On June 1, 1986, the EPA placed the Nepera site on the National Priorities List (NPL) of sites under the Comprehensive Environmental Response Compensation and Liability Act 1980 (CERCLA), as amended. NYSDEC continued as the lead regulatory agency overseeing the implementation of the RI/FS.

Under an Administrative Order with NYSDEC, signed on March 21, 1988, the Potentially Responsible Party (PRP), namely Nepera Chemical Company, Inc., hired a contractor to conduct a Remedial Investigation/Feasibility Study (RI/FS) of the site in 1988. The first draft RI was submitted in March 1996. EPA determined that further work was necessary to define the type and extent of soil contamination at the site and to determine the downgradient extent of the contaminant plume which emanated from the site. In March 2005, an updated draft RI was submitted to NYSDEC and USEPA. This document was revised and a Final RI Report was submitted on June 16 2006.

The lead agency for the Nepera site was recently re-designated, at the conclusion of the RI/FS process, from NYSDEC to USEPA.

SUMMARY OF SOIL AND GROUNDWATER SAMPLING

Major RI activities performed during field data collection activities included: on-site soil borings, soil sampling, monitoring well drilling and installation, groundwater sampling, and residential well sampling. The results of the RI are summarized below.

Soil

The PRP performed the RI in several phases. Soil sampling activities were conducted in 1991 and 1996. Focused soil sampling identified contamination in the lagoon area and determined the lagoon area to be the primary source of the contaminants in the groundwater plume. The primary contaminants identified during soil sampling activities include benzene (maximum concentration of 13 milligrams per kilogram (mg/kg)), chlorobenzene (maximum concentration of 12 mg/kg), ethylbenzene (maximum concentration of 22 mg/kg), toluene (maximum concentration of 52 mg/kg), xylenes (maximum concentration of 300 mg/kg) and pyridine-related compounds (maximum concentration of 74 mg/kg of 2-amino pyridine). Each of these contaminants are considered as Contaminants of Concern (COCs) for the Site. In addition, several samples detected elevated levels of metals, including mercury and manganese. An additional 120 soil samples were collected from the lagoon area in 2003 to evaluate concentration levels of metals. Soil samples were also collected from locations not impacted by the site to determine Site-specific background levels for metals. Analytical data from the 2003 sampling activities indicated that the metals in the lagoon area were analogous to background concentrations and, as such, metals are not considered to be COCs. The presence of mercury in earlier samples (from 1991 and 1995) was of additional concern as the form of mercury (e.g., organo-mercury or inorganic mercury) can significantly change its toxicity. As such, additional analyses were performed on selected samples from the 2003 activities to determine form (or species) of mercury present in Site soils. These analyses determined that over 99% of the mercury present in Site soils is in the form of inorganic mercury, which is significantly less toxic than organo-mercury.

As stated earlier, the former lagoons are within an area approximately 5 acres in size, but the total area of the actual six lagoons is smaller. The total area of contaminated soils (i.e., the six lagoons) is estimated to be 128,850 square feet (approximately 3 acres). The volume calculations for contaminated soil are based on the actual surface area of each lagoon, the average depth of the overburden within each lagoon (down to bedrock), the thickness of a distinct black-stained layer observed during the completion of test pits, and the clean fill put on the lagoons. The average overburden thickness was estimated to range from 3.4 (for lagoon 6) to 13.3 feet (for Lagoon 3). The total volume of contaminated soil is estimated to be 30,086 cubic yards. Furthermore, it is estimated that 20% (approximately 6,000 cubic yards) of this is comprised of shale and cobble which will be sorted-out prior to implementing a soil remedy. Therefore, the remedial alternatives assessed in this Proposed Plan are based on the total volume of contaminated soil being 24,086 cubic yards, which is equivalent to approximately 38,700 tons of contaminated soil.

Groundwater

The groundwater monitoring program included sampling of groundwater monitoring wells located at (and bordering) the site and analyses of these samples for organic and inorganic compounds. These efforts were comprised of several separate field mobilizations conducted between 1995 and 2003. The investigation was conducted in an iterative manner, where the results of each task were used to develop the scope of each subsequent task. The RI included:

- Installing permanent groundwater monitoring wells to act as fixed monitoring and/or compliance points within both the overburden aquifer and the bedrock aquifer. A total of 38 groundwater monitoring wells were installed in the study area.
- Collecting a series of groundwater samples from the assembled monitoring network;
- Identifying the Contaminants of Potential Concern in both aquifers;

- Characterizing the horizontal and vertical extent of site-related contaminants in the overburden and bedrock aquifers and determining the extent of the groundwater contaminant plume;

As with the contaminated soil, the primary contaminants identified in groundwater include benzene, chlorobenzene, ethylbenzene, toluene, xylenes and pyridine-related compounds. These contaminants were detected above MCLs in the wells located within the property boundary.

Residences in the vicinity of the site rely on private wells for their potable water supply. As a precautionary measure, to ensure that these wells are not impacted by the Site, private wells in the immediate vicinity of the Site have routinely been sampled for Site-related contaminants. With the exception of minor levels of Site-related contaminants detected below drinking water standards (e.g., MCLs) in May 2002 and September 2003, sampling data indicates nondetectable levels of Site-related contaminants in private wells. Also, because of their close proximity to the Site (approximately 800 feet), the public wells located on County Highway 4, which are used to supply drinking water to customers served by the Village of Maybrook, are monitored on a quarterly basis for Site-related contaminants and must comply with the New York State Department of Health drinking water standards. Site-related contaminants have not been detected in the Village of Maybrook Public Wells.

Sediment

As stated earlier, the Site is bounded by Beaverdam Brook to the west and the Otter Kill to the south. Since the hydrogeological link between groundwater and these water bodies was not clear, sediment samples were collected in 1985, 1991, and 1995 from Beaverdam Brook and the Otter Kill.

The EPA performed additional sediment sampling from the floor of Beaverdam Brook in 2003. Groundwater flow direction was considered to determine sampling location points. Samples were collected from a total of 27 sampling locations, upstream, downstream, and adjacent to the Site, and were analyzed for volatile organic compounds and semi-volatile organic compounds (including Site-related COCs). Site-related COCs were not detected in these samples.

RISK SUMMARY

The purpose of the risk assessment is to identify potential cancer risks and noncancer health hazards at the site assuming that no further remedial action is taken. A baseline human health risk assessment was performed to evaluate current and future cancer risks and noncancer health hazards based on the results of the Remedial Investigation.

WHAT IS RISK AND HOW IS IT CALCULATED?

A Superfund baseline human health risk assessment is an analysis of the potential adverse health effects caused by hazardous substance releases from a site in the absence of any actions to control or mitigate these under current- and future-land uses. A four-step process is utilized for assessing site-related human health risks for reasonable maximum exposure scenarios.

Hazard Identification: In this step, the contaminants of concern (COC) at a site in various media (*i.e.*, soil, groundwater, surface water, and air) are identified based on such factors as toxicity, frequency of occurrence, and fate and transport of the contaminants in the environment, concentrations of the contaminants in specific media, mobility, persistence, and bioaccumulation.

Exposure Assessment: In this step, the different exposure pathways through which people might be exposed to the contaminants identified in the previous step are evaluated. Examples of exposure pathways include incidental ingestion of and dermal contact with contaminated soil. Factors relating to the exposure assessment include, but are not limited to, the concentrations that people might be exposed to and the potential frequency and duration of exposure. Using these factors, a "reasonable maximum exposure" scenario, which portrays the highest level of human exposure that could reasonably be expected to occur, is calculated.

Toxicity Assessment: In this step, the types of adverse health effects associated with chemical exposures and the relationship between magnitude of exposure and severity of adverse effects are determined. Potential health effects are chemical-specific and may include the risk of developing cancer over a lifetime or other noncancer health effects, such as changes in the normal functions of organs within the body (*e.g.*, changes in the effectiveness of the immune system). Some chemicals are capable of causing both cancer and noncancer health effects.

Risk Characterization: This step summarizes and combines outputs of the exposure and toxicity assessments to provide a quantitative assessment of site risks. Exposures are evaluated based on the potential risk of developing cancer and the potential for non-cancer health hazards. The likelihood of an individual developing cancer is expressed as a probability. For example, a 10^{-4} cancer risk means a "one-in-ten-thousand excess cancer risk"; or one additional cancer may be seen in a population of 10,000 people as a result of exposure to site contaminants under the conditions explained in the Exposure Assessment. Current Superfund guidelines for acceptable exposures are an individual lifetime excess cancer risk in the range of 10^{-4} to 10^{-6} (corresponding to a one-in-ten-thousand to a one-in-a-million excess cancer risk) with 10^{-6} being the point of departure. For noncancer health effects, a "hazard index" (HI) is calculated. An HI represents the sum of the individual exposure levels compared to their corresponding reference doses. The key concept for a non-cancer HI is that a "threshold level" (measured as an HI of less than 1) exists below which non-cancer health effects are not expected to occur.

A baseline ecological risk assessment was also conducted to assess the risk posed to ecological receptors due to site-related contamination.

Human Health Risk Assessment

As part of the RI/FS, a baseline human health risk assessment was conducted to estimate the risks associated with the current and future effects of contaminants on human health and the environment. A baseline human health risk assessment is an analysis of the potential adverse human health effects caused by hazardous-substance exposure in the absence of any actions to control or mitigate these under current and future land uses. A four-step human health risk assessment process was used for assessing site-related cancer risks and noncancer health hazards. The four-step process is comprised of: Hazard Identification of Chemicals of Potential Concern (COPCs), Exposure Assessment, Toxicity Assessment, and Risk Characterization (see adjoining box "What is Risk and How is it Calculated").

The human health risk estimates summarized below are based on reasonable maximum exposure scenarios and were developed by taking into account various conservative estimates about the frequency and duration of an individual's exposure to the site-related contaminants both for adults and children, as well as the toxicity of these contaminants.

The baseline risk assessment began with selecting COPCs in the various media (e.g., soil and groundwater) that would be representative of site risks. The property is currently zoned as agricultural/residential. Though the land is currently undeveloped, the reasonably anticipated future land use, based on its current zoning, is residential. As such, the risk assessment was based on a future anticipated residential land-use scenario (the most conservative scenario), though, an open-space, park setting was also considered in the baseline risk assessment. In addition, the potential future use of groundwater as a drinking water source is consistent with the State use designation of the aquifer. The baseline risk assessment considered health effects for trespassers/hikers, maintenance workers, and residents who may be exposed to contaminants in the soils by ingestion, inhalation, and dermal contact, and ingestion and inhalation of groundwater used as a potable water supply. In this assessment, exposure point concentrations were estimated using either the maximum detected concentration of a contaminant or the 95 percent upper confidence limit of the average concentration. Chronic daily intakes were calculated based on the reasonable maximum exposure (RME), which is the highest exposure reasonably anticipated to occur at the site. The RME is intended to estimate a conservative exposure scenario that is still within the range of possible exposures. Central tendency exposure (CTE) assumptions, which represent typical average exposures, were also developed. A complete summary of all exposure scenarios can be found in the baseline human health risk assessment.

Human Health Risks

In the Human Health Risk Assessment, chemical data were used to calculate cancer risks and noncancer health hazards expressed as individual Hazard Quotients (HQ). These cancer and noncancer risks, for the most conservative scenario (namely, future residential use of the Site) are expressed below.

EPA's statistical analysis of the groundwater sampling data indicates that the probable exposure concentrations of benzene (330 ug/l), xylenes (270 ug/l), 2-aminopyridine (189 ug/l), and aniline (16 ug/l), when evaluated under future residential exposure scenarios, are associated with noncancer hazard quotients of 21, 4, 570, and 23, respectively. In addition, the concentration of benzene is associated with an excess lifetime cancer risk of 1×10^{-3}. All of these values exceed EPA's acceptable levels of noncancer hazard or excess lifetime cancer risk.

Similarly, EPA's evaluation of the soils indicates that direct exposure to the probable exposure concentrations of benzene (4,440 ug/kg), toluene (10,000 ug/kg), chlorobenzene (1,000 ug/kg), xylenes (69,000 ug/kg), and 2-aminopyridine (23,400 ug/kg) are associated with hazard quotients of 42, 7, 5, 61, and 2, respectively. All of these values exceed EPA's acceptable levels of noncancer hazard. In addition, the concentration of benzene is associated with an excess lifetime cancer risk of 1×10^{-4}.

These risk and hazard levels indicate that there is significant potential risk to receptors from direct exposure to contaminated soil and groundwater. The risk estimates are based on current reasonable maximum exposure scenarios and were developed by taking into account conservative assumptions about the frequency and duration of an individuals' exposure to the soil and groundwater, as well as the toxicity of these chemicals.

These calculated risks to human health indicate that action is necessary by EPA to undertake remedial measures to reduce the risks associated with the observed contamination in soil and groundwater and restore the groundwater to beneficial use.

Ecological Risk Assessment

A baseline ecological risk assessment (BERA) was prepared to identify the potential environmental risks associated with surface water, groundwater, sediment, and soil. The results of the BERA suggested that there are contaminants in groundwater, soils, and sediment, but they are not present at levels posing significant risks to ecological receptors. The potential for risk to ecological receptors exposed to site-related contaminants was limited to isolated locations, primarily in Lagoon 6, and the risk associated with this area used the conservative assumption that the ecological receptors (e.g., soil invertebrates, mammalian insectivores, and carnivores) spend 100% of their lives in the area of Lagoon 6. The contaminants that were identified in the BERA (outside of Lagoon 6) were determined not to pose a potential for adverse ecological effects because they were common elements of soil that were not related to Site operations, the detected concentrations were lower than background levels, the frequency of detections was low, or the HQs were only slightly above 1 with no adverse impacts to populations expected. A detailed presentation of these data can be found in the RI Report.

Risk Summary Conclusion

Exposure to contaminated soil poses risks to human health. Furthermore, the contaminated soil continues to be a source of groundwater contamination. As such, it was decided that a remedial action should be taken to reduce contamination in the soil to levels below cleanup objectives. In addition, exposure to contaminated groundwater poses risks to human health. As such, it was decided that a remedial action should be taken to restore the contaminated groundwater for future use.

REMEDIAL ACTION OBJECTIVES

Remedial action objectives (RAOs) are media-specific goals to protect human health and the environment. These objectives are based on available information and standards such as applicable or relevant and appropriate requirements (ARARs), to-be-considered (TBC) guidance, and risk-based levels established in the risk assessment.

The overall remedial action objective is to ensure the protection of human health and the environment. The general remedial objectives identified for the Site are to:

1. prevent exposure, to contaminated soils and contaminated groundwater, to human and ecological receptors;
2. minimize migration of contaminants from soils to groundwater;
3. restore the aquifer(s) to beneficial use;
4. ensure that hazardous constituents within the soil and groundwater meet acceptable levels consistent with reasonably anticipated future use; and
5. minimize potential human contact with waste constituents.

Preliminary Remediation Goals

Preliminary Remediation Goals (PRGs) were selected based on federal and state promulgated ARARs, risk-based levels, background concentrations, and guidance values. These PRGs were then used as a benchmark in the technology screening, alternative development and screening, and detailed evaluation of alternatives presented in the subsequent sections of the FS Report. The PRGs for groundwater and soil are shown in Table 1 below.

Table 1: Preliminary Remediation Goals

Contaminant	PRG for Groundwater (ug/L) *	PRG for Soils (ug/kg)
Benzene	1	60 ***
Chlorobenzene	5	1,100 ***
Ethylbenzene	5	1,000 ***
Toluene	5	700 ***
Xylenes	5	1,600 ***
2-amino pyridine	1	400 ****
Pyridine	50	400 ****
Alpha picoline	50	575 ****
Acetone	50	50 ***
Aniline	5	1,510 ****
Pyridine-related tentatively identified compounds	50	400 ****

* Groundwater cleanup levels for organic COCs are based on the more conservative of the Federal Maximum Contaminant Levels (MCLs) and the New York Ambient Groundwater Standards and Guidance Values (NYSDEC TOGs 1.1.1, June 1998).

*** The values shown are from *NYSDEC Subpart 375: Remedial Program Soil Cleanup Objectives.*

**** The values shown were derived by NYSDEC based on the *Division Technical and Administrative Guidance Memorandum: Determination of Soil Cleanup Objectives and Cleanup Levels, Division of Hazardous Waste Remediation, January 24, 1994.*

SUMMARY OF REMEDIAL ALTERNATIVES

CERCLA Section 121(b)(1), 42 U.S.C. Section 9621(b)(1), mandates that remedial actions must be protective of human health and the environment, cost-effective, comply with other statutory laws (ARARs), and utilize permanent solutions and alternative treatment technologies and resource recovery alternatives to the maximum extent practicable. Section 121(b)(1) also establishes a preference for remedial actions which employ, as a principal element, treatment to permanently and significantly reduce the volume, toxicity, or mobility of the hazardous substances, pollutants, and contaminants at a site. CERCLA Section 121(d), 42 U.S.C. Section 9621(d) further specifies that a remedial action must attain a level or standard of control of the hazardous substances, pollutants, and contaminants, which at least attains ARARs under federal and state laws, unless a waiver can be justified pursuant to CERCLA Section 121(d)(4), 42 U.S.C. Section 9621(d)(4).

The objective of the feasibility study (FS) was to identify and evaluate cost-effective remedial action alternatives which would minimize the risk to public health and the environment resulting from soil and groundwater contamination at the site.

Detailed descriptions of the remedial alternatives for addressing the contamination associated with the site can be found in the FS report. This document presents a summary of the six soil remediation alternatives and five groundwater remediation alternatives that were evaluated.

The remedial alternatives are described below.

Common Elements for All Alternatives

All alternatives would include institutional controls. Specifically, an environmental easement/restrictive covenant would be filed in the property records of Orange County. The easement/covenant would, at a minimum, require: (a) with the exception of Alternative S6 – Excavation and Off-Site Disposal, restricting any excavation below the soil surface layer in those areas undergoing remediation, unless the excavation activities are in compliance with an EPA approved site management plan; (b) restricting new construction at the Site unless an evaluation of the potential for vapor intrusion is conducted and mitigation, if necessary, is performed in compliance with an EPA approved site management plan; (c) restricting the use of groundwater as a source of potable or process water unless groundwater quality standards are met; and (d) the owner/operator to complete and submit periodic certifications that the institutional and engineering controls are in place.

A Site Management Plan (SMP) would be developed to address soils and groundwater at the Site. The SMP would provide for the proper management of all Site remedy components post-construction, such as institutional controls, and shall also include: (a) monitoring of Site groundwater to ensure that, following the soil excavation, the contamination is attenuating and groundwater quality continues to improve; (b) identification of any use restrictions on the Site; (c) necessary provisions for implementation of the requirements of the above easement/covenant; and (d) provision for any operation and maintenance required of the components of the remedy.

In addition, physical controls, such as regular maintenance of the perimeter fence, would be implemented to restrict Site access and thereby prevent the potential exposure to chemicals present in the soils in the vicinity of the former lagoons.

Finally, all groundwater remedial alternatives would include the requirement that those private wells, in the vicinity of the Site, currently being monitored in relation to this Site will continue to be monitored on an ongoing basis. The frequency of the residential well sampling will be determined during Remedial Design.

Soil Remedial Alternatives

Alternative S1 - No Action

Capital Cost:	$0
Annual Cost:	$0
Present-Worth Cost:	$0
Construction Time:	Not Applicable

The "No Action" alternative is considered in accordance with NCP requirements and provides a baseline for comparison with other alternatives. If this alternative were implemented, the current status of the site would remain unchanged. Institutional controls would not be implemented to restrict future site development or use. Engineering controls would not be implemented to prevent site access or exposure to site contaminants. Although existing security fencing at the site would remain, it would not be monitored or maintained under this alternative.

Alternative S2 – Institutional Controls with Limited Actions

Capital Cost:	$12,600
Annual Cost:	$13,550
Present-Worth Cost:	$217,000
Construction Time:	3 months

This alternative is comprised of the institutional controls mentioned previously. Physical controls would also be used to eliminate the future potential for on-Site exposures. A perimeter security fence (with appropriate warning signs) has been constructed to restrict Site access and thereby prevent the potential exposure to chemicals present in the surface soils in the vicinity of the former lagoons. The Site security fencing and warning signs would be routinely inspected and maintained at the Site to restrict access to the Site.

Institutional controls as the sole remedy would not be an adequate substitute for engineering controls at this Site. This Alternative would not achieve the Remedial Action Objectives. Accordingly, this alternative will not be retained for further consideration. Institutional controls, however, as described in this alternative, will be retained as components of other remedial alternatives.

Alternative S3 – Installation of a Cap Over the Contaminated Soils

Capital Cost:	$2,290,000
Annual Cost:	$24,000
Present-Worth Cost:	$2,647,000
Construction Time:	8 months

Under this alternative, a cap would be constructed over the area with contaminated soils. This area has soils above the water table with concentrations exceeding the NYSDEC Soil Cleanup Objectives.

Chemicals in the soils above the water table would be contained by a cap. The cap would serve to inhibit infiltration of precipitation and thereby reduce leaching of chemicals from the soils to groundwater, and, therefore, reduce chemical concentrations in the overburden and bedrock groundwater over time. The decreased infiltration over the former lagoon area would result in a lowering of the water table in the overburden aquifer directly beneath the Site and, hence, further reduce the chemical migration from this area via groundwater transport.

Alternative S4 – Excavation and On-Site SVE and Biocell

Capital Cost:	$2,388,000
Annual Cost:	$406,000
Present-Worth Cost:	$3,119,000
Construction Time:	2 years

This alternative would involve the excavation of the soils within the former lagoons and treatment of the soils with concentrations of Contaminants of Concern (COCs) exceeding the NYSDEC Soil Cleanup Objectives on-Site utilizing SVE and biological degradation within an engineered below-grade biocell. Excavated soils would be treated to reach target cleanup levels.

The soils would be treated within the biocell by installing perforated pipes within multiple layers of the biocell. The perforated pipes would be connected to a blower unit to draw air through the piles; contaminants would be volatilized into this air. The air would be treated, if necessary, using carbon adsorption, prior to being recirculated or exhausted to the atmosphere. Nutrients would be added to the treatment layers as required to enhance biological degradation.

In general, the biocell would be operated in two primary modes: SVE mode (high air flow rate); and bioremediation mode (low air flow rate).

During the SVE mode, the system would be operated at higher air flow rates which would be selected to optimize the removal of the volatile organic compounds (VOCs) constituents using SVE. After the removal rate of the VOCs decreases to an asymptotic or nominal rate, the system would be switched over to the bioremediation mode. During the bioremediation mode, the system would be operated at an optimized air flow rate selected to sustain the aerobic biodegradation of the remaining VOCs and semi-volatile organic compounds (SVOCs).

Alternative S5 – In-Situ Soil Vacuum Extraction

Capital Cost:	$1,211,000
Annual Cost:	$460,900
Present-Worth Cost:	$2,302,000
Construction Time:	4 years

This alternative involves the installation of an in situ soil vacuum extraction system (ISVE) in the area identified for potential soil remediation. A drainage swale would be constructed along the edge of the treatment area to prevent surface water run-on to the treatment area.

The soil vapor extraction wells would be strategically placed within the area of soil to be treated to ensure that airflow within the area is maximized. The extraction wells would consist of a screened section of pipe (or pipes) placed in a permeable packing with the top few feet of the well grouted to prevent the short circuit of airflow from the surface. An impermeable temporary cap would be placed over the treatment area to minimize infiltration of precipitation, lower the water table and increase the volume of the unsaturated zone, and prevent short circuiting of airflow directly from the surface.

The extraction wells would be installed with vacuum and positive pressures being applied at alternating well locations to create an induced pressure gradient to move the vapors through the soil. Extracted vapors would be treated utilizing carbon filters, if required, prior to being reinjected or exhausted to the atmosphere. Vapor-phase nutrients would also be injected into the soils, if needed, to enhance biodegradation.

Alternative S6 – Excavation and Off-Site Disposal

Capital Cost:	$11,208,000
Annual Cost:	$22,000
Present-Worth Cost:	$11,228,000
Construction Time:	1 year

Alternative S6 involves the excavation of soils within the former lagoons containing COCs at concentrations exceeding NYSDEC Soil Cleanup Objectives. The excavated soils would be disposed of off Site at an appropriate landfill.

The Capital Cost associated with Alternative S6, as reported in the FS Report, has a significant range because it is not exactly known how much of the contaminated soil would be classified as hazardous waste and would, therefore, be more expensive to handle and dispose. The Capital Cost cited above represents the high end of the range. The Capital Cost associated with the low end of the range is $5,736,000.

Alternative S6 would include the following major components:

- pre-design investigation;
- excavation of on-site soils exceeding soil cleanup objectives for the COCs;
- post excavation sampling to verify achievement of soil cleanup objectives;
- disposal of excavated soils at appropriate off-site facility (or facilities);
- backfilling of excavated areas with clean fill.

Groundwater Remedial Alternatives

Alternative GW1 – No Action

Capital Cost:	$0
Annual Cost:	$0
Present-Worth Cost:	$0
Duration Time:	0 months

The No Action alternative was retained for comparison purposes as required by the NCP. No remedial actions would be implemented as part of this alternative. Groundwater would continue to migrate and contamination would continue to attenuate through dilution. This alternative does not include institutional controls or long-term groundwater monitoring.

Alternative GW2 – Enhanced Bioremediation with Long-Term Groundwater Monitoring

Capital Cost:	$13,200
Annual Cost:	$106,700
Present-Worth Cost:	$528,000
Duration Time:	8 years

This alternative involves the manipulation of Site groundwater conditions to enhance in situ bioremediation of the COCs by the indigenous microbial population. The design details for enhanced bioremediation would be established following the removal of the source area soils. The excavated area will be treated with oxygenating compounds to create an aerobic environment and, thereby, stimulate biodegradation within the area of elevated groundwater contamination. Multiple applications of the oxygenating compounds may be necessary. This will be followed by a long-term groundwater monitoring program where groundwater samples would be collected and analyzed regularly in order to verify that the concentrations and the extent of groundwater contaminants are declining. The exact frequency and parameters of sampling and location of any additional monitoring wells would be determined during the design phase. The site-related COCs are susceptible to degradation in aerobic conditions. To enhance aerobic biodegradation outside of the source area, the remedial design will consider the controlled, location-specific injection(s) of oxygenating compounds into the groundwater contamination plume(s) at various locations to stimulate biodegradation of COCs. Multiple injections over time may also be necessary for this action to be fully effective.

The groundwater monitoring program would be conducted to ensure that this remedy was protective, that the concentrations of COCs were attenuating, and to evaluate the rates of biodegradation/bioremediation (in both the bedrock and overburden aquifers).

Alternative GW3 – Groundwater Extraction and Treatment (Pump And Treat)

Capital Cost:	$1,656,000
Annual Cost:	$229,000
Present-Worth Cost:	$3,339,000
Duration Time:	13 years

Under this alternative, an overburden and bedrock groundwater collection system would be installed downgradient of each area with identified soil and groundwater concentrations above the potential cleanup levels. The components of this alternative include the installation of several strategically located bedrock groundwater extraction wells and a water table tile collection system installed in two areas of the overburden (downgradient of the source area to capture both the north and south components of the groundwater flow from the source area). The collection systems would be designed to minimize the migration of contaminants in groundwater and to restore the aquifer(s) to beneficial use. The bedrock extraction wells would pipe contaminated groundwater to a groundwater treatment system for treatment; the tile collection system would route contaminated groundwater in the overburden to the groundwater treatment system for treatment. This alternative would prevent the potential migration of chemicals off Site via groundwater transport. The collected groundwater would be treated via a carbon adsorption system located along the western edge of the Site to meet discharge standards as well as water quality requirements for discharge to Beaverdam Brook.

An ongoing groundwater monitoring program would be conducted to ensure that this remedy was protective.

Alternative GW4 – Enhanced Bioremediation

Capital Cost:	\$332,000
Annual Cost:	\$106,700
Present-Worth Cost:	\$846,000
Duration Time:	8 years

This alternative involves the manipulation of Site groundwater conditions to enhance in situ bioremediation of the COCs by the indigenous microbial population. The design details for enhanced bioremediation would be established following the treatment/removal of the source area soils. Treatment would involve either the controlled injection of oxygenating compounds (e.g., Oxygen Releasing Compounds (ORCs)) to enhance biodegradation of the COCs or the controlled injection of a chemical oxidizer (e.g., hydrogen peroxide) and nutrients into the groundwater contamination plumes to chemically convert the organic contamination into nonhazardous compounds. The preliminary design assumes that 440 injection points would be required for the injection of ORC into the overburden groundwater. The area would encompass both the source area and locations downgradient of the source area, including both the north and south components of the groundwater flow. Multiple injections over time may be necessary for this action to be fully effective.

An ongoing groundwater monitoring program would be conducted to ensure that this remedy was protective, that the concentrations of COCs were attenuating, and to evaluate the rates of biodegradation/bioremediation (in both the bedrock and overburden aquifers).

Alternative GW5 – Biosparging

Capital Cost:	\$191,000
Annual Cost:	\$106,700
Present-Worth Cost:	\$738,000
Duration Time:	8 years

Under this alternative, pressurized gas (i.e., oxygen) would be injected into the groundwater at very low flowrates to enhance bioremediation. Specifically, the biosparging technology considered here is "in situ Submerged Oxygen Curtain" (iSOC). This technology injects supersaturated oxygen into the groundwater such that oxygen is infused into groundwater without the formation of bubbles. This prevents vapors (e.g., the bubbles) from entering the vadose zone. The vadose zone is that portion of the soil between the land surface and the zone of saturation, or, in other words, the vadose zone extends from the ground surface to the water table.

An ongoing groundwater monitoring program would be conducted to ensure that this remedy was protective.

EVALUATION OF ALTERNATIVES

In selecting a remedy for a site, EPA considers the factors set forth in CERCLA §121, 42 U.S.C. §9621, by conducting a detailed analysis of the viable remedial alternatives pursuant to the NCP, 40 CFR §300.430(e)(9) and OSWER Directive 9355.3-01. The detailed analysis consists of an assessment of the individual alternatives against each of nine evaluation criteria and a comparative analysis focusing upon the relative performance of each alternative against those criteria.

- Overall protection of human health and the environment addresses whether or not a remedy provides adequate protection and describes how risks posed through each exposure pathway (based on a reasonable maximum exposure scenario) are eliminated, reduced, or controlled through treatment, engineering controls, or institutional controls.
- Compliance with applicable or relevant and appropriate requirements addresses whether or not a remedy would meet all of the applicable or relevant and appropriate requirements of other federal and state environmental statutes and regulations or provide grounds for invoking a waiver.
- Long-Term effectiveness and permanence refer to the ability of a remedy to maintain reliable protection of human health and the environment over time, once cleanup goals have been met. It also addresses the magnitude and effectiveness of the measures that may be required to manage the risk posed by treatment residuals and/or untreated wastes.
- Reduction of toxicity, mobility, or volume through treatment is the anticipated performance of the treatment technologies, with respect to these parameters, a remedy may employ.
- Short-Term effectiveness addresses the period of time needed to achieve protection and any adverse impacts on human health and the environment that may be posed during the construction and implementation period until cleanup goals are achieved.
- Implementability is the technical and administrative feasibility of a remedy, including the availability of materials and services needed to implement a particular option.

- Cost includes estimated capital and operation and maintenance costs, and net present-worth costs.

- State acceptance indicates whether, based on its review of the RI/FS reports and the Proposed Plan, the State concurs with, opposes, or has no comment on the preferred remedy at the present time.

- Community acceptance will be assessed in the ROD, and refers to the public's general response to the alternatives described in the Proposed Plan and the RI/FS reports.

A comparative analysis (one for soils and one for groundwater) of these alternatives, based upon the evaluation criteria noted above, follows.

Comparative Analysis for Soils

- Overall Protection of Human Health and the Environment

  Alternatives S1 and S2 would not be protective of human health and the environment, since they would not actively address the contaminated soils, which present unacceptable risks of exposure and are a source of groundwater contamination. Alternative S3 would be protective of human health and the environment in that the cap would prevent exposure to contaminated soil and would also serve to minimize infiltration of precipitation and thereby reduce leaching of chemicals from the soils to groundwater, hence, reducing contamination of the groundwater; however, Alternative S3 would not actively remediate contaminated soil. Alternatives S4, S5, and S6 would be protective of human health and the environment, since each alternative relies upon a remedial strategy or treatment technology capable of eliminating human exposure and removing the source of groundwater contamination.

- Compliance with ARARs

  The soil cleanup objectives used for the Site are based on NYSDEC values (*NYSDEC Subpart 375: Remedial Program Soil Cleanup Objectives* - and/or- NYSDEC's *Division Technical and Administrative Guidance Memorandum: Determination of Soil Cleanup Objectives and Cleanup Levels, Division of Hazardous Waste Remediation, January 24, 1994.)* These NYSDEC soil cleanup objectives were utilized as PRGs for the site-related contaminants.

  Since the contamination in the soils would not be addressed under Alternatives S1 and S2, they would not achieve the soil cleanup objectives. While the cap installed under Soil Alternative S3 would comply with RCRA design standards, this alternative would not actively remediate contaminated soil and, as such, would not achieve the soil cleanup objectives. Alternatives S4 and S5 would each attain the soil cleanup objectives specified. Alternative S6 would involve the excavation and removal of the contaminated soil from the site, and thereby achieve soil cleanup objectives for the Site property.

  Alternatives S4 and S6 both involve the excavation of contaminated soils and would, therefore, require compliance with fugitive dust and VOC emission regulations. In addition, Alternative S6 would be subject to New York State and federal regulations related to the transportation and off-site treatment/disposal of wastes. In the case of Alternatives S4 and S5, compliance with air emission standards would be required for the SVE or ISVE system. Specifically, treatment of off-gases would have to meet the substantive requirements of New York State Regulations for Prevention and Control of Air Contamination and Air Pollution (6 NYCRR Part 200, et seq.) and comply with the substantive requirements of other state and federal air emission standards.

- Long-Term Effectiveness and Permanence

  Alternatives S1 and S2 would not involve any active remedial measures, and, as such, not be effective in eliminating the potential exposure to contaminants in soil and would result in the continued migration of contaminants from the soil to the groundwater. Alternative 3 involves installation of a landfill cover which would eliminate the potential exposure to contaminants in the soil and also reduce leaching of contaminants from the soil to groundwater. Alternatives S4, S5, and S6 would each be effective in the long term by either removing the contaminated soils from the Site or treating them in place.

- Reduction in Toxicity, Mobility or Volume

  Alternatives S1 and S2 would provide no reduction in toxicity, mobility, or volume of contaminants. Alternative S3 would reduce the migration of contaminants from soil to groundwater but would not provide a reduction in toxicity or volume of contaminants. Alternatives S4 and S5 would reduce toxicity, mobility, and volume of contaminants through on-site treatment. Under Alternative S6, the toxicity, mobility, and volume of the contaminants would be eliminated by removing contaminated soil from the Site property.

- *Short-Term Effectiveness*

Alternative S1 and S2 do not include any physical construction measures in any areas of contamination and, therefore, would not present any potential adverse impacts to on-property workers or the community as a result of their implementation. Alternatives S3, S4, S5, and S6 could result in some adverse impacts to on-property workers through dermal contact and inhalation related to the installation of the remedial systems associated with each of these alternatives. Alternatives S4 and S6 involve significant excavation activities that would need to be properly managed to prevent or minimize adverse impacts. For instance, excavation activities would need to be properly managed to prevent transport of fugitive dust and exposure of workers through dermal contact and by inhalation of volatile organic compounds in the air. Noise from the treatment unit and the excavation work associated with Alternatives S3, S4, S5, and S6 could present some limited adverse impacts to on-property workers, while truck traffic related to Alternative S6 could provide nuisance impacts (e.g., noise and traffic) to nearby residents. In addition, interim and post-remediation soil sampling activities would pose some risk to on-property workers. The risks to on-property workers and nearby residents under all of the alternatives could, however, be mitigated by following appropriate health and safety protocols, by exercising sound engineering practices, and by using proper protective equipment.

Alternatives S4 and S6 involve significant excavation activities that would need to be properly managed to prevent or minimize adverse impacts. For instance, excavation activities would need to be properly managed to prevent transport of fugitive dust and exposure of workers to volatile organic compounds in the air.

Since no actions would be performed under Alternative S1, there would be no implementation time. Since only limited actions would be performed under Alternative S2, there would be very little implementation time. It is estimated that Alternative S3 would require 3 months to complete the landfill cap, Alternative S4 would require 2 years to complete, Alternative S5 would require 4 years to complete, and Alternative S6 would require approximately one year to complete.

- Implementability

Alternatives S1 and S2 would be the easiest soil alternatives to implement in that there are no field activities to undertake.

Alternatives S3, S4, S5, and S6 would all employ technologies known to be reliable (though the biocell proposed as a component of Alternative S4 is a lesser known technology relative to the site-related COCs) and that can be readily implemented. In addition, equipment, services, and materials needed for these alternatives are readily available, and the actions under these alternatives would be administratively feasible. Furthermore, sufficient facilities are available for the treatment/disposal of the excavated materials under Alternative S6.

Monitoring the effectiveness of the SVE system (in Alternative S4), and the ISVE system (in Alternative S5) would be easily accomplished through soil and soil-vapor sampling and analysis. Under Alternatives S4, S5, and S6, determining the extent of soil cleanup would be easily accomplished through post-excavation soil sampling and analysis.

- Cost

The estimated capital, annual operation and maintenance (O&M) (including monitoring), and present-worth costs for each of the soil remediation alternatives are presented in Table 2. All costs are presented in U.S. Dollars.

Table 2: Cost Analysis for Soil Remediation Alternatives

Remedial Alternative	Capital Cost	Annual O&M Cost	Present Worth Cost	Construction Time
S1	0	950	15,000	No time
S2	12,600	13,550	217,000	Months
S3	2,290,000	24,000	2,647,000	Several months to install cap
S4	2,388,000	406,000	3,119,000	2 years
S5	1,211,000	460,900	2,302,000	4 years
S6	5,736,000	22,000	5,756,000	1 year

According to the capital cost, O&M cost and present worth cost estimates, Alternative S1 has the lowest cost and Alternative S6 has the highest cost when comparing all Alternatives.

Comparative Analysis for Groundwater

- Overall Protection of Human Health and the Environment

All alternatives except GW1 would provide adequate protection of human health and the environment. As noted above in the risk assessment section, there are unacceptable human health cancer risks or non-cancer health hazards associated with the groundwater contamination at the site. Though no private wells exist on the Site property, the future use of groundwater as a drinking water source is consistent with the State use designation of the aquifer and such use would present unacceptable present and future carcinogenic and noncarcinogenic risks at the Site. These calculated risks to human health require EPA to enact remedial measures to reduce the risks associated with the observed contamination and restore the groundwater to beneficial use. EPA believes that Alternatives GW2, GW4 and GW5 would ultimately provide full protection of human health by reducing contaminant concentrations to cleanup objectives. Alternative GW3 would also reduce contaminant concentrations through treatment, would prevent migration of chemicals off-Site via groundwater transport, and, ultimately, restore the aquifer(s) to best use.

- Compliance with ARARs

EPA and the New York State Department of Health (NYSDOH) have promulgated health-based protective MCLs (40 CFR Part 141, and 10NYCRR, Chapter 1 and Part 5), which are enforceable standards for various drinking water contaminants (chemical specific ARARs). The aquifer at the Site is classified as Class GA (6 NYCRR 701.18), meaning that it is designated as a potable water supply.

Alternative GW1 does not include any active groundwater remediation; contamination in the groundwater would likely attenuate naturally, to some degree, particularly after a soil remedy is implemented. Alternatives GW2, GW4, and GW5 involve the manipulation of Site groundwater conditions to enhance in situ bioremediation of the COCs by the indigenous microbial population, and, thereby, break-down the COCs into non-hazardous compounds. Alternatives GW2, GW4, and GW5, each focus on the most contaminated regions of the bedrock and overburden aquifers (e.g., under and immediately downgradient of the source area) and, as such, would decrease the amount of time needed to achieve cleanup objectives. Following implementation of Alternatives GW2, GW4 or GW5, it is estimated that ARARs would be achieved throughout the Site within ten years after the soil remedy is implemented. Under Alternative GW3, groundwater would be extracted from both the bedrock and the overburden aquifers, treated by a carbon adsorption system, and discharged to Beaverdam Brook. The discharge to Beaverdam Brook would comply with surface water discharge requirements and the disposition of treatment residuals would have to be consistent with the Resource Conservation and Recovery Act (RCRA). Alternative GW3 would prevent the potential migration of chemicals off Site via groundwater transport and, as such, ARARs would be met downgradient of the groundwater containment system (e.g., off the site property); ultimately, treatment of the contaminated groundwater would achieve ARARs within the site property and would restore the aquifer(s) to best use.

For Alternatives GW2, GW3, GW4, and GW5, compliance with ARARs would be demonstrated through a long-term groundwater monitoring program.

- Long-Term Effectiveness and Permanence

Once the source control remedy is implemented, it is anticipated that all of the groundwater alternatives would achieve groundwater ARARs, although Alternative GW1 would be expected to take the longest. The time to achieve groundwater standards would vary for the other alternatives due to the complex nature of the subsurface environment.

Alternative GW3 would prevent the potential migration of chemicals off Site via groundwater transport, but would take longer to achieve cleanup objectives than Alternatives GW2, GW4, or GW5. As Alternatives GW2, GW4, and GW5 focus on the most contaminated regions of the bedrock and overburden aquifers, these alternatives would be expected to achieve aquifer restoration more quickly than the other alternatives.

- Reduction in Toxicity, Mobility or Volume

Alternatives GW2, GW4, and GW5 would each reduce the volume and toxicity of the contaminants through treatment by chemically breaking down the bulk of the dissolved VOC and SVOC contamination as it migrates through the aquifer. The VOC and SVOC contaminants would be changed into degradation products.

Alternative GW3 would reduce the toxicity, mobility, and volume of contaminated groundwater through removal and treatment with the goal of restoring the aquifers to their beneficial uses.

GW1 provides no further reduction in toxicity, mobility or volume of contaminants of any media through treatment. Following implementation of the source area remedy, natural attenuation processes would likely occur to some degree even under this alternative. Future risks posed by the site will depend on future site usage.

- Short-Term Effectiveness

Alternative GW1 presents virtually no change to the short-term impacts to human health and the environment since no construction or active remediation is involved. Alternatives GW2, GW3, GW4, and GW5 each present some risk to on-property workers through dermal contact and inhalation from activities associated with groundwater remediation. Specifically, construction and remedial activities required to implement Alternatives GW2, GW4, and GW5 would potentially pose a risk of worker exposure to the oxygenating compound(s) when injected into the aquifer. The possibility of having to readminister oxygenating compound(s) in future injections is likely. Alternative GW3 would potentially result in greater short-term exposure to contaminants to workers who install extraction wells and the groundwater tile collection system, as well as come into contact with the treatment system. In addition, under Alternatives GW2, GW3, GW4, and GW5, some adverse impacts would result from disruption of traffic, excavation activities, noise, and fugitive dust emissions. However, proper health and safety precautions would minimize short-term exposure risks as well as disturbances.

- Implementability

Alternative GW1 would be the easiest groundwater alternative to implement, since it would require no activities. Alternative GW3 would be the most difficult alternative to implement in that it would require the construction of a groundwater extraction system including piping and a tile water collection system. Alternative GW2 would be easier to implement than Alternatives GW4 and GW5. The services and materials necessary for each of the groundwater alternatives are readily available. Under Alternatives GW2, GW3, GW4, and GW5, groundwater sampling would be necessary to monitor treatment effectiveness. Each of the alternatives have been proven effective for most, if not all, of the COCs in groundwater.

- Cost

The estimated capital, annual operation and maintenance (O&M) (including monitoring), and present-worth costs for each of the soil remediation alternatives are presented in Table 3. All costs are presented in U.S. Dollars.

Table 3: Cost Comparison for Groundwater Remediation Alternatives

Remedial Alternative	Capital Cost	Annual Cost	Present Worth	Duration of Operation
GW1	0	950	15,000	N/A
GW2	13,200	106,700	528,000	8 years
GW3	1,656,000	229,000	3,339,000	13 years
GW4	332,000	106,700	846,000	8 years
GW5	191,000	106,700	738,000	8 years

According to the capital cost, O&M cost and present worth cost estimates, Alternative GW1 has the lowest cost and GW3 has the highest cost when comparing all alternatives.

- State Acceptance

NYSDEC concurs with the preferred remedy.

- Community Acceptance

Community acceptance of the preferred remedy will be assessed in the ROD following review of the public comments received on the Post Decision Proposed Plan.

PREFERRED ALTERNATIVES

Based upon an evaluation of the various alternatives, EPA recommends employing Alternative S4 (Excavation and On-Site SVE and Biocell) to remediate the source area and Alternative GW2 (Enhanced Bioremediation with Long-Term Groundwater Monitoring) to remediate the groundwater. Implementation of these alternatives would include institutional controls to restrict groundwater use and prevent disturbance of the soils in the biocell until groundwater ARARs and/or soil cleanup objectives are met.

Specifically, an environmental easement/restrictive covenant would be filed in the property records of Orange County. The easement/covenant would, at a minimum, require: (a) restricting any excavation below the soil surface layer in the area of the biocell, unless the excavation activities are in compliance with an EPA-approved site management plan; (b) restricting new construction at the Site unless an evaluation of the potential for vapor intrusion is conducted and mitigation, if necessary, is performed in compliance with an EPA approved site management plan; (c) restricting the use of groundwater as a source of potable or process water unless groundwater quality standards are met; and (d) the owner/operator to complete and submit periodic certifications that the institutional and engineering controls are in place.

A Site Management Plan (SMP) would be developed to address soils and groundwater at the Site. The SMP would provide for the proper management of all Site remedy components post-construction, such as institutional controls, and shall also include: (a) monitoring of Site groundwater to ensure that, following the soil excavation, the contamination is attenuating and groundwater quality continues to improve; (b) identification of any use restrictions on the Site; (c) necessary provisions for implementation of the requirements of the above easement/covenant; and (d) provision for any operation and maintenance required of the components of the remedy.

Upon completion of remediation, no hazardous substances would remain above levels that would prevent unlimited use or unrestricted exposure. Under the preferred remedy, EPA would conduct reviews of the site at least once every five years until groundwater remediation has restored the aquifer(s) to drinking water quality standards and soil cleanup objectives are met.

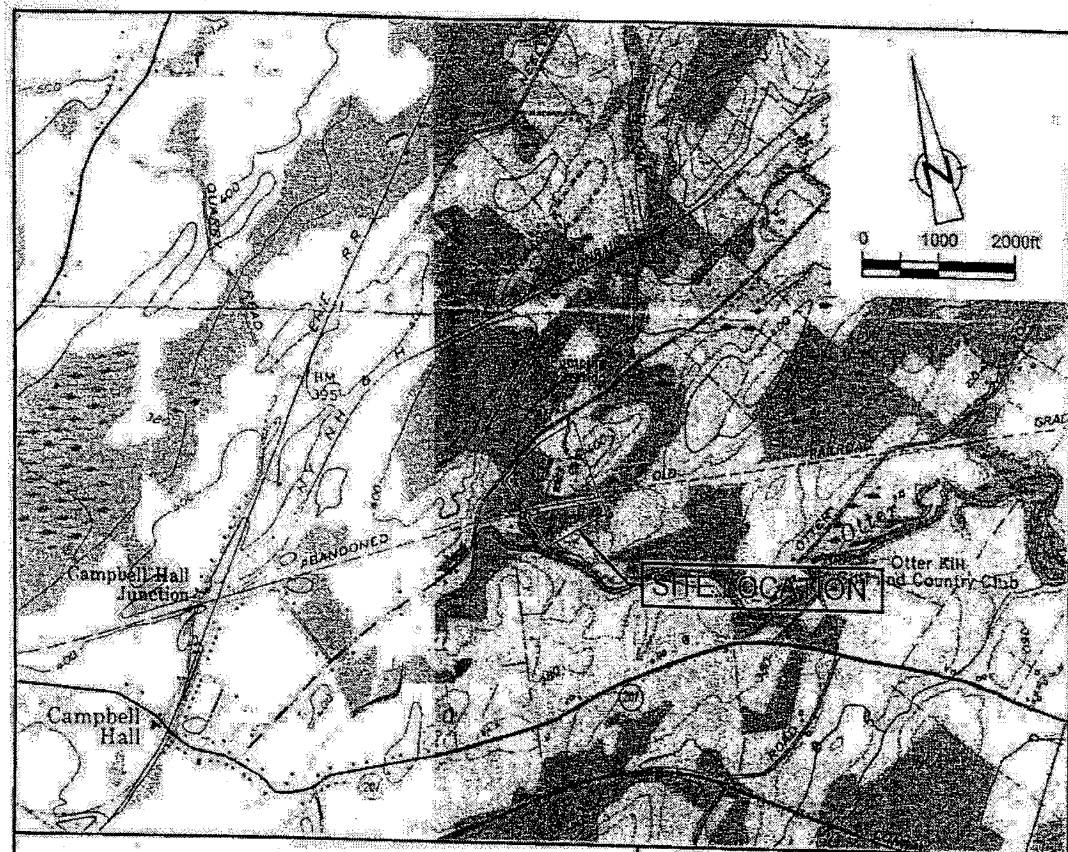
Basis for the Remedy Preference

EPA believes that Alternative S4 is the most cost-effective option for the contaminated soils given the evaluation criteria and reasonably anticipated future land use. While Alternative S4 may involve potential short-term community impacts in the form of nuisances associated with construction (e.g., noise and truck traffic), Alternative S4 would be protective of human health and the environment. Furthermore, Alternative S4 would provide a permanent solution, and would achieve soil cleanup objectives for the site-related COCs in the shortest amount of time and in the most cost-effective manner. Therefore, EPA and NYSDEC believe that Alternative S4 would effectuate the soil cleanup while providing the best balance of tradeoffs with respect to the evaluating criteria.

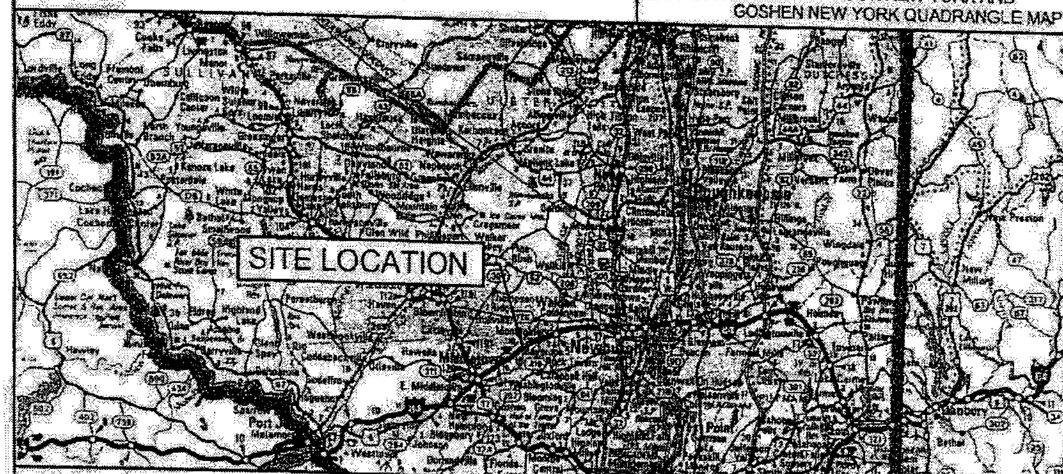
Alternative S1 was not identified as the preferred alternative because it calls for no action and would not be protective of human health and the environment. Similarly, Alternative 2 would only provide limited action by imposing institutional controls and site fencing and warning maintenance signs. Alternative 3 was not proposed because, while it is slightly less expensive than Alternative 4, it calls for containment of the waste constituents and provides no treatment of the contamination. Alternative 5 was not proposed because, while it includes the soil vapor extraction technology of Alternative 4, it does not include the biological treatment component, which EPA believes will be effective in addressing the pyridine-related compounds. Alternative 6 was not proposed because it would not appear to be cost-effective compared to the other alternatives.

EPA is proposing Alternative GW2 to address the contaminated groundwater because the Agency believes it would be protective of human health and the environment and would achieve the ARARs in the most cost-effective manner. Alternative GW1 would rely solely on natural processes to restore groundwater quality to beneficial use, and, as such, would take significantly longer than the preferred alternative. While Alternative GW3 would prevent the potential migration of chemicals off Site via groundwater transport, it would take longer to achieve cleanup objectives and would cost significantly more than Alternatives GW2, GW4, and GW5. While Alternatives GW2, GW4, and GW5 are similar in that they each involve the addition of oxygen into the groundwater environment to enhance biodegradation of the contaminants, Alternative GW2 would be easier to implement then the other alternatives, and is expected to cost significantly less.

Therefore, EPA and NYSDEC believe that the combination of Alternatives S4 and GW2 would successfully remediate the contaminated soils and expedite the remediation of contaminated groundwater at the Site, while providing the best balance of tradeoffs among the alternatives with respect to the evaluation criteria. Furthermore, the preferred remedies would utilize permanent solutions and treatment technologies to the maximum extent practicable.



SOURCE: USGS MAYBROOK NEW YORK AND GOSHEN NEW YORK QUADRANGLE MAP



SOURCE: RAND McNALLY ROAD ATLAS

HAMPTONBURGH
NEW YORK

figure 1

SITE LOCATION
FORMER LAGOON SITE
Hamptonburgh, New York

03698-00(032)GN-WA014 JUN 23/2006

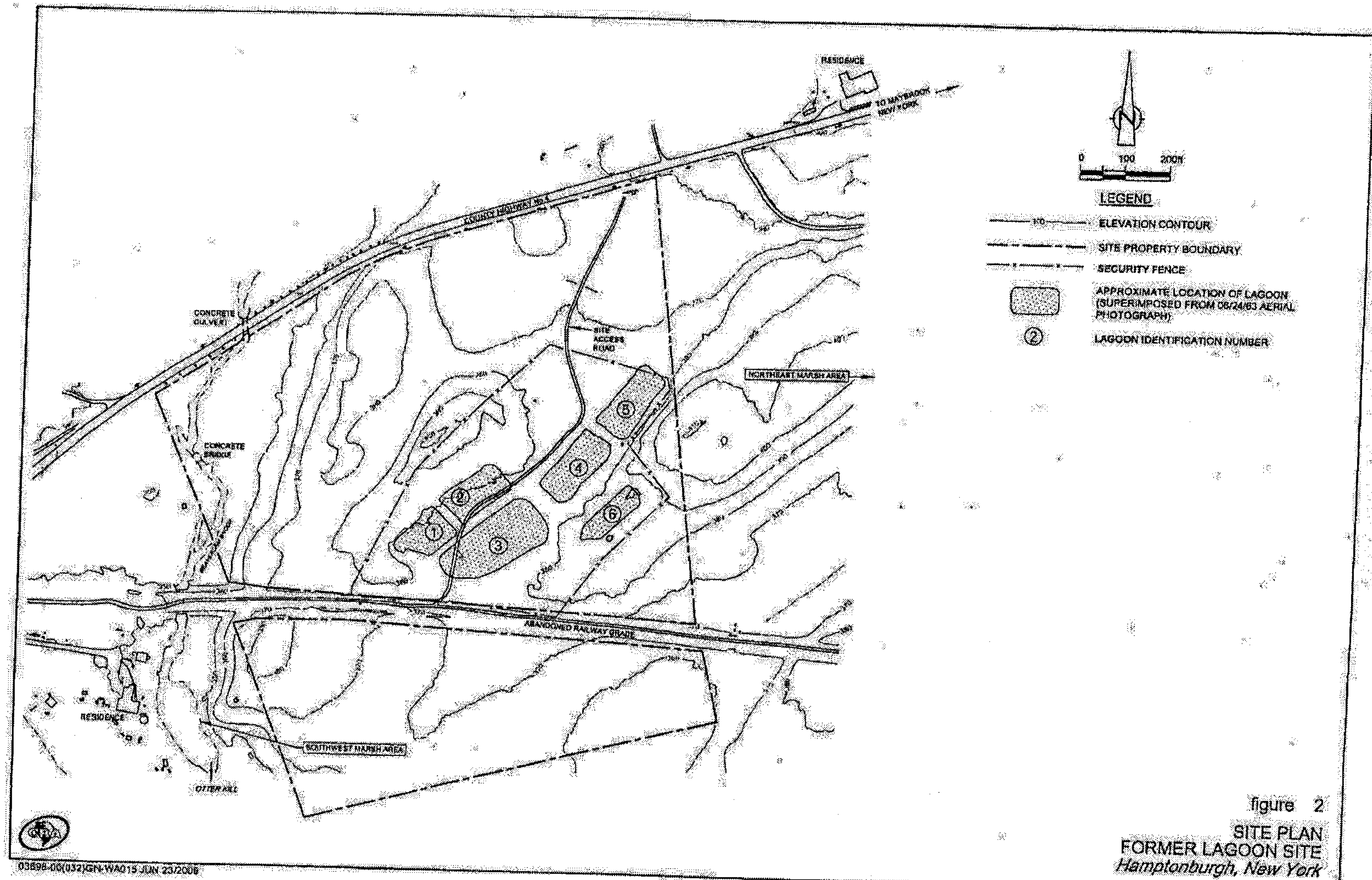


figure 2
SITE PLAN
FORMER LAGOON SITE
Hamptonburgh, New York

RESPONSIVENESS SUMMARY

APPENDIX V-a1

New York State Concurrence with
the Selected Remedy in the July 2007 Proposed Plan

New York State Department of Environmental Conservation
Division of Environmental Remediation, 12th Floor
625 Broadway, Albany, New York 12233-7011
Phone: (518) 402-9706 • **FAX:** (518) 402-9020
Website: www.dec.ny.gov

Alexander B. Grannis
Commissioner

JUL 26 2007

Mr. George Pavlou
Director, Emergency & Remedial Response Division
United States Environmental Protection Agency
Floor 19
290 Broadway
New York, NY 10007-1866

Re: Nepera Maybrook
Site No. 336010
Proposed Remedial Action Plan

Dear Mr. Pavlou:

The New York State Department of Environmental Conservation and the New York State Department of Health have reviewed the above referenced Proposed Remedial Action Plan (PRAP). The State concurs with the selected remedy as stated in the July 2007 PRAP, and as summarized below

- The soil remedy will consist of the excavation of the soil from the six former wastewater lagoons and the treatment of the contaminated soil with soil vapor extraction (SVE) and biological degradation within an engineered below-grade biocell. If necessary, the air removed from the biocell via the SVE will be treated using carbon adsorption prior to being recirculated or exhausted to the atmosphere. It is expected that this remedy will achieve TAGM 4046 and Part 375 soil cleanup objectives as stated in the PRAP.

- The groundwater remedy will remediate site groundwater conditions through enhanced in-situ bioremediation of the groundwater contaminants by the indigenous microbial population. The excavated lagoon areas will be treated with oxygenating compounds to create an aerobic environment and stimulate biodegradation of groundwater within the areas of elevated contamination.

- The application of the oxygenating compounds will be followed by a long-term groundwater monitoring program to evaluate the rates of biodegradation and contaminant attenuation and will ensure that this remedy is protective of human health and the environment. It is expected that the groundwater remedy will achieve New York State groundwater standards.

- To enhance aerobic biodegradation outside of the source area, the remedial design will consider location-specific injections of oxygenating compounds at various locations in the groundwater contamination plumes.

- The private supply wells in the vicinity of the site, currently being monitored for site relat contaminants, will continue to be sampled periodically as deemed necessary by the NYSDOH.

- The remedy will include institutional controls in the form of an environmental easement/restrictive covenant to be filed in the property records of Orange County to restrict any excavation below the soil surface layer in those areas undergoing remediation, restrict new construction at the site, restrict the use of groundwater as a source of potable process water, and require that the owner/operator complete and submit periodic certifications that the institutional and engineering controls are in place.

- A Site Management Plan (SMP) will be developed to provide for the proper management of all post-construction site-remedy components, such as institutional controls and engineering controls (such as the perimeter fence), identification of site use restrictions, enforcement of the requirements of the easement/covenant, operation and maintenance of the remedy components, and implementation the groundwater monitoring program.

- The institutional controls will continue to apply to the site and the SMP will continue to b implemented until such time as both the site soil cleanup objectives and the groundwater standards are met and discontinuation of the ICs and the SMP is approved by all agencies involved with this project.

If you have any questions, please contact Robert Cozzy at 402-9767.

Sincerely,

Dale A. Desnoyers
Director
Division of Environmental Remediaiton

c: M. MacCabe
M. Dannenberg, USEPA

ec: S. Ervolina
R. Cozzy
J. Aversa
R. Schick
R. Pergadia, Region 3
A. Perretta, NYSDOH
M. Rivara, NYSDOH
S. Bates, NYSDOH
G. Litwin, NYSDOH
J. LaPadula, USEPA
A. Carpenter, USEPA

RESPONSIVENESS SUMMARY

APPENDIX V-b

TRANSCRIPT OF PUBLIC MEETING
AUGUST 16, 2007
HAMPTONBURGH TOWN HALL
CAMPBELL HALL, NEW YORK

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

STATE OF NEW YORK, COUNTY OF ORANGE

---x

IN THE MATTER REGARDING NEPERA CHEMICAL COMPANY, INC., SUPERFUND SITE

---x

PUBLIC MEETING

DATE: THURSDAY, AUGUST 16, 2007

LOCATION: HAMPTONBURGH TOWN HALL

18 Bull Road

Campbell Hall, New York

TIME: 7:12 p.m.

A P P E A R A N C E S:

U. S. Environmental Protection Agency

Intergovernment & Community Affairs Branch
290 Broadway, 26th Floor
New York, New York 10007

CECILIA ECHOLS, Community Involvement Coordinator

ALSO PRESENT:

JOHN LaPADULA

MARK DANNENBERG

MICHAEL CYVAK

P R O C E E D I N G S

CECEILIA ECHOLS: Good evening. Thank you all so much for coming out tonight to hear how EPA plans on cleaning up the Nepera Chemical Superfund Site. I'm Cecilia Echols, and I am the Community Involving Coordinator for this site.

At this site, there is contaminated soil as well as groundwater, and that's what we're here to express to you all how we plan on cleaning up this site and hearing your comments, and I hope many of you have had an opportunity to review the proposed plan. We also had handouts on the table in the back, the proposed plan as well as the presentation tonight, and the public notice that was placed in the newspaper.

As I said, I'm Cecilia Echols, and we have other EPA people here to give the presentation. We have John LaPadula. He's to the left of me. He'll give the Superfund remedial process. Mark Dannenberg, he's project manager. He'll discuss the site background, preferred response action. And then we'll open up for all your questions and answers.

Please hold all your questions until after the presentation. You can also, on the presentation handouts, write your little questions, if you'd like, and have them addressed after the presentation.

Community Relations is a program that wants the community involved in the decision-making process, which directly affects you where a Superfund Site is. So that is why we come out here for public comment. The public comment period started July 31st, and it ends on

August 29th.

As I said, please hold your questions to the end. Please state your name loudly as the stenographer requested shortly ago. There is an information repository. There is one here. There is also one in Manhattan. You can also go online. If you look at the proposed plan on the bottom, there is a web page for all documents related to this site. You can always go online to review those documents at your leasure.

There is also an 800 number. 800 number comes into my office. If you have any questions regarding this site, it would be directed to me. The 800 number is 1-800-346-5009.

Once we receive all of the public comment, we then open -- we go through a process of we come -- I'm sorry. We develop a synopsis of all of the concerns and comments from you all written, or e-mailed, or from tonight; there will be a transcript, and then they -- we compile a Record of Decision, which is signed by the regional administrator. That will be explained a little bit more in John's presentation.

I would like to recognize a

couple of other people here tonight. We have Anthony Peretta. He's a Project Manager with New York State DOH. Joel Crua? He's a Supervisor in the New York State DOH. Susan Spear, she's with Congressman John Paul's office. Rich Mayfield, County Executive for Ed Diana, and Supervisor Jankowski. Thank you.

And now, we will move on to the next agenda item, which is the Superfund Remedial Process.

JOHN LaPADULA: Thank you, Cecilia, and thank you all for coming tonight.

I'm just going to briefly go over a little bit of the background of Superfund and what the remedial process includes to put tonight's meeting kind of in a perspective.

Congress enacted Superfund in 1980, as a result of several notorious sites that we became aware of in the late 1970's. The Valley of the Drums in Kentucky was one of them, and the other one was Love Canal, which is a little closer to home.

And at that point this was a -- the beginning, I would say, the environmental movement. Rachel Carson, Silent Spring was in the early '60's and through the '60's into the '70's we became aware of lots of sites, lots of properties that were heavily contaminated over manufacturing and disposal or improper disposal that occurred for much of the Twentieth Century.

The Superfund law was called Comprehensive Environmental Response Compensation Liability Act. It was passed and enacted in 1980, and it was amended in 1986 with a series of amendments.

The law basically provides money for the Federal Government to spend on the clean up of hazardous waste sites. Most of them are what we would describe as uncontrolled hazardous waste sites, and they could present immediate problems, or they could present long-term problems. It also -- the law also gave the EPA the authority to have companies that are deemed responsible for contributing to the contamination of the sites the authority to get the companies to actually do the work.

So the concept was that for sites, where there were no companies that could be identified, the Federal Government would provide the funding to conduct the investigation and the clean-ups. For other sites, we were able to identify the potentially responsible parties, it would allow us to give us the authorization to enter into legal contracts with them, so that they could do the studies and conduct the clean-ups. And, for those sites, EPA has an oversight role.

The State of New York also has an oversight role. The -- I'm sorry. Go back. I was going to go back to the site discovery.

This is a list of the different component sites we'll actually go through. Once we become aware of a site, it could be from State, it could be from the county or local government, also from private citizens, if they're aware of property that might have some contamination, we would be notified, and we go though a site discovery and ranking process. It's actually a formal process.

We collect data and analyze the data; putting to a process that's been laid out by Congress, and we rank the site, and the sites that are on the Superfund list, that's the Federal list, were the sites that were ranked. All of these sites were ranked across the country. New York has about 110 of them originally. Many of them are deleted now. These are the Federal sites.

Once the site is placed on the National Priority's List, we can spend money to start an investigation to characterize the extent of contamination at the properties. The study is called Remedial Investigation, and it involves a plan to sample soil waste material, groundwater wetlands, or surface waters, if they're adjacent to the site; sediments in the wetlands in the surface waters in the site. On a lake it could be the lake bottoms as well.

All of that data is then reviewed and analyzed to see if, in fact, the site does present a risk to public health and the environment. Many of the sites do, and after we have made that determination then we identify through the feasibility site process different alternatives that would address the contamination.

For example, if the soil were contaminated, there might be different types of approaches you could take to clean the soil or remediate the soil. You might incinerate it. You might try to detoxify it. You might dig it up and take it away. There's different types of options.

Similarly for the groundwater there will be different approaches as to how the groundwater could be cleaned. So remedial investigation and the feasibility study are what we're going to present to you this evening; the finding of both of those efforts.

We have prepared a proposed plan, and that's a summary of the two studies and the alternatives that were looked at, and it also identifies what we in the State believe is the preferred alternative to address the contaminated media at the site. We will -- Mark will, you know, describe all the alternatives and explain, you know, what we decided to propose.

We're most interested in your comments on what the proposal is. We will, as Cecilia said, we will consider all the comments here, that are submitted in writing, that are submitted by e-mail, and respond to all the comments, and then based on public comment, will decide whether or not to proceed and sign a Record of Decision. That's the next step that we would authorize the clean up of the site.

So for this evening, much of the talk will be from Mark, and he will describe the study that has been done.

EPA did not and the State did not do the study themselves. As Mark will explain, how the study was done essentially by the responsible parties. EPA and the State were to all to -- to direct and oversee that the work was being done according to the processes and protocols that we would normally use.

Once the Record of Decision is signed, after we received the comments at the end of the public comment period, the next phases of the Superfund process, which are the next two major phases, would be designing the remedies, which is a detailed engineering design with blue prints, and plans, and specs signed and sealed by engineers of the State of New York, and the last phase is actually the implementation of the construction phase, where the remedy would be constructed, and earth would move, and wells might be put in for groundwater treatment, and that type of thing.

Once the site construction activities are done, there may be a period of time, depending on the site and what's being remediated, that the treatment systems may have to operate. Sometimes groundwater treatment systems can operate for five years, ten years, until the groundwater is restored to drinking water standards. Sometimes soil remedies would take also several years until the contaminants are removed or reduced in soil.

So the construction is really

the physical construction of getting the remedy set up for it's continued, let's say, removal of the contaminants or detoxification of the groundwater or for the soil.

That's all I wanted really to say, and then to turn it over to Mark, who will go through the work that EPA, and the State, and the responsible parties have been doing for the last number of years.

MARK DANNENBERG: Thank you, John.

Thank you all for coming too and showing your interest in this site.

The proposed remedial copies were mailed out to probably most of you. There are additional copies here.

In short, the proposed remedial action was constructed for remedial alternatives to be considered for clean up of soils and groundwater at the site. It also identifies aquifer remedies and all rational plans.

The proposed remedial action plan also solicits public comment on all alternatives evaluated, expressed concerns of the community to be considered, also express comment period, and, as indicated earlier, the EPA will take into consideration all public comments.

Also, as John indicated before, the Record of Decision is our final decision document for the site, and it will include these responses to public comments.

This is a fairly large depiction of the general area of the site. It's a regional water level location map. Right here is the site (indicating); this dark area right here, and you can see there is waterway, Beaver Dam Brook, wraps around on the left side of the site and down here to Otterkill.

GERTRUDE HODGES: How do we

know exactly where it is without having any road designations or whatever?

MARK DANNENBERG: Well, I'll have another illustration.

GERTRUDE HODGES: But what do you mean?

MARK DANNENBERG: Do you know were Highway 4 is?

GERTRUDE HODGES: No.

MARK DANNENBERG: County 4 is? How County 4 -- you don't know? Okay. You know where Maybrook Road is?

GERTRUDE HODGES: Uh-huh.

MARK DANNENBERG: Maybrook Road is County Highway 4.

GERTRUDE HODGES: Were is it on the map?

MARK DANNENBERG: It fronts

the property on the site, on the north side.

CECEILIA ECHOLS: Your name, ma'am?

GERTRUDE HODGES: My name is Gertrude Hodges. And the property I'm concerned about is 41 Jones Lane off of Neelytown Road.

MARK DANNENBERG: I want to start just a little bit of the history of the site. From 1953 to 1967 the site was used by the Nepera Chemical Company. They trucked waste water from their facility in Harriman to this site. It was discharged in the lagoons constructed in the Earth. So there were six lagoons constructed in all.

GERTRUDE HODGES: What does that mean?

CECILIA ECHOLS: Could you hold your questions until the end?

GERTRUDE HODGES: He's not explaining it clear enough for me to follow along with him. What's he talking about a ravine? Was it a pond --

MARK DANNENBERG: A lagoon is somewhat like a pond, waste water is placed in there.

GERTRUDE HODGES: Holding

place?

MARK DANNENBERG: Yeah.

GERTRUDE HODGES: I'm sorry.

MARK DANNENBERG: All right. This is a little bit clearer (indicating). Right here is Maybrook Road, County Highway 4. This is an access road coming in. Here are the six constructed lagoons on the site.

The site is about 29 acres in size. Out of the 29 acres, these lagoons comprised up four and a half acres of the site. To the west side, I've indicated this on a bigger map. You can see a little better here (indicating). This is Beaver Dam Brook; has a little pond here, and all of this drains into Otterkill on the south side of the site. There are three residences right nearby. There is one right here. There is another one right across from the access road in the site. This again is the access road and there is another one down here on the far side of the pond.

The U.S. EPA placed this site on the National Priorities List in 1986. DEC was the primary lead at that point. It went into an agreement with the responsible party here, Nepera Chemical Company, Inc., to conduct and review an investigation and a feasibility study. Nepera Chemical Company shortly afterward contracted with a consultant to do the actual work, the actual investigation.

I just want to add to that. Over the last few years, the EPA really has been the primary oversight lead on the site, and DEC is also the oversight.

Okay. The remedial investigation was conducted in several phases. First phase was done from

1988 to 1992. A lot of soil samples were taken from the lagoon area to identify contamination. Groundwater monitoring wells were installed at the site, and groundwater monitoring program began. There are -- note also, actually, I say, over here groundwater monitoring wells were installed in both the overburden aquifer and the bedrock aquifer. There are two groundwater bodies at this site. The overburden which is -- it's much more of a superficial. It's a water table aquifer, and underlining that is the bedrock. The bedrock also contains an aquifer, and they're interconnected.

The next phase of the remedial investigation report was conducted in 1995, '96, and '97. A lot more soil samples were collected from the lagoons to better identify the contaminants of the site. The groundwater monitoring was continued again to ensure that groundwater was not migrating from the site.

And in the third phase, additional monitoring was installed in 2001 to ascertain the extent of the contaminates. Again, there was concern as to whether the contamination was spreading. So we had the responsible party install additional wells. Groundwater monitoring continued. It was installed in 2001, 2002 during this phase, and we also went out and collected 120 additional soil samples that were analyzed for inorganics; metals in particular. This was directed specifically to determine whether or not there was no contamination on the site.

After the -- after collecting all this data -- we have hundreds of points of data from soil sampling as well as groundwater sampling -- we evaluated the data, looked at it, determined the following contaminants were present in on-site subsurface soils as well as the ground; the contaminants, specifically toluene, xylene, benzene, chlorobenzene, ethylbenzene and pyridine compounds. There were a couple of different compounds found. The test involved soil and groundwater.

Other findings from the remedial investigation were the organics were found at elevated levels in subsurface soils throughout the whole lagoon area. They were also found in elevated levels in both aquifers. From all of the samples we took, in particular with the extra amount of sampling we did, we determined that there were no elevated levels of inorganics at the site. They were analogous; similar to background samples from locations uncontaminated by the lagoons, and, therefore, metals and inorganics are not contaminants or a concern at the site.

Furthermore, it was determined

also that the former lagoons are not only contaminated, but they are acting as a source of groundwater contamination, and based on these results the remedial investigation -- of the remedial investigation, based on risk assessment, was conducted to actually estimate the risks.

To summarize the risks, EPA bases its remedial action on minimizing threats to human health and the environment. This is fairly typical, and since the main concern for soil contamination stems really from health risks, both from direct contact to contaminated soil and from secondary contamination of water supplies, this is, you know, a primary concern.

We determined there are no current unacceptable risks to human health, current. Site related contaminates have been found in groundwater above drinking water standards. Now, here too, I'd like to point out, these are above drinking water standards. There is some groundwater on the site. There are no drinking water wells located on the site, but the concentrations of contaminants in the drinking water are higher than drinking water standards.

There are -- there's a potential for unacceptable risk to human health for future uses; such as, if a drinking water well was installed at the site, that would be a risk. And there is potential that additional drinking waters could be impacted, if the groundwater contamination was spread.

Okay. Remedial action objectives; these are goals to protect human health and the environment. These objectives were based on available information and on standards. Specific remedial action objectives for the site are to prevent exposure to contaminated soils, to minimize migration of contaminate in soils to groundwater, and to ensure that contaminates are cleaned up to acceptable levels.

For groundwater, the objective would be to restore the groundwater to beneficial use, which is drinking water quality. This is because New York State has designated groundwater in the area as sources of drinking water and to prevent further migration of contaminated groundwater.

The next step in the process is the feasibility study. John talked about this a little bit earlier. It was conducted to determine what remedial actions may be appropriate at the site, and then to evaluate these options, and determine what actually would be the best choice.

Through this process, it began really with many alternatives, many possible alternatives. There alternatives were screen through, to really hone down the list to a focused list. This focused list is reported in the feasibility study report as well as in the proposed plan. It presents six remedial alternatives for contaminated groundwater and five remedial alternatives for contaminated groundwater -- it's six for soil, five for groundwater. I'm sorry.

These are the specific alternatives for soil. The first alternative is no action. Actually I'll list these up front, and I'll be describing each of these alternatives more specifically in the following slides.

The second alternative is institutional controls with limited physical controls.

Third is installation of a cap over the contaminated area.

Fourth is excavation of contaminated soil and placement of that soil into an on-site biocell and soil vapor extraction system.

The fifth alternative is in-situ soil vapor extraction, and the final alternative, number six, is excavation of all contaminated soil and remove it for off-site disposal.

The first remedial action is literally no action. This is required actually under law so that we have a baseline to compare all the other alternatives to. Takes no action, and the contaminants would remain on site.

The second alternative, institution of controls, are mechanisms that can be instituted to control the use of the property. An example might be to ban the installation of drinking water wells. So here institutional controls, such as deed restrictions or environmental easements, would be considered; physical controls such as restricting site access, and maintaining the perimeter fence at the site. Again, contaminates can remain on the site for this alternative.

The third alternative is to place a cap over all the contaminated soil. This would both prevent people from contact with the contaminated soil underneath the cap, and it would eliminate the possibility of precipitation really going through that contaminated soil, and percolating down, and dragging the contaminants with it into the groundwater. On top I say: Installation of a cap landfill cover. It's not a landfill at the site, but it is a landfill-type cover. It would be a cap.

The fourth alternative is excavation of all contaminated soil. Placement of that contaminated soil into a lined cell, called biocell, and placement of a soil vapor extraction system also within the cell. So really would have -- would give dual system. It would have two technologies built into the system. One would be biocell. The other would be soil vapor extraction. Soil vapor extraction is a technology. It's used to reduce concentrations of violative organics. All of the -- well, five out of the six contaminants that I listed earlier are violative organics. The other one, pyridine compounds, is a semi-volatile, and that can also be influenced by the soil vapor extraction unit. And the soil vapor extraction unit basically what you do is you hook up a couple of wells, and you hook up a vacuum, literally a vacuum, and you suck the vapor out of the back, and then you pull the contaminants out.

The fifth alternative is in-situ soil vapor extraction. Soil vapor extraction system here would operate much the same as it would in the fourth alternative. The difference is that term, "in-situ," which basically means it would be below the ground in the natural environment. Installed in the property as it is -- extracted vapors. I'm sorry. If you could bring back that for a second.

Extracted vapors would be treated, if necessary, use of carbon prior to discharge. Basically the carbon you would pass the vapors through a granulated carbon unit. The contaminants would absorb on top through granulated carbon, and there would be a solid phase. You would still have to dispose of, at that point, the carbon contaminants. It would be a much smaller quantity. The air passing through would be cleaned.

Okay. The sixth alternative would be excavation and off-site disposal. This would involve excavating all contaminated soil on a site and taking it to a licensed landfill, a licensed facility. The -- after the excavation is done, post excavation confirmatory sampling program would be instituted, and this would just be really enacted to make sure that things were being done right. The post excavation sampling would be done just to make sure you're on clean soil.

The alternatives for groundwater are again no action, enhanced bioremediation, long-term groundwater monitoring; ground water extraction and treatment; enhanced bioremediation; biosparging. Now, here with the exception of the no action alternative, all of the other alternatives I only indicated here on the groundwater alternative two, but all of them would necessitate or involve some type of long-term monitoring program.

Okay. This same picture I showed earlier, but superimposed on it is kind of a curved line over here, a purple line. I don't know if you can make that out that it's purple from back here, but this basically indicates all our groundwater contamination. It's still contained on site, but this would be a groundwater we would be concerned with.

Again, a no action alternative is required as a baseline just to compare our alternatives to. No groundwater would actually be treated in any way.

For alterative two is enhanced bioremediation. It involves manipulating the site groundwater conditions to enhance bioremediation. Oxygen and nutrients would be put into the groundwater to basically help the microbes for bacteria that are there to biodegrade the contaminants.

The third alterative we refer to pretty much a pump and treat. You would extract the water, you would pump the water out from the ground water, and you would treat it, and here would be extracted water from both aquifers, the overburden and the bedrock, and here too the groundwater would be treated using carbon absorption system. It's the same thing I explained before with the carbon and you have a solid waste to dispose of. The -- I'm sorry go ahead.

The fourth alternative also involves manipulating site groundwater conditions to enhanced bioremediation of contaminants. An oxygenated compound would be injected into the groundwater at multiple points to induce biodegradation.

And the fifth and final groundwater alternative is biosparging. Which, like two of these other alternatives, would manipulate the site groundwater conditions. The difference really is how the -- how the conditions are being manipulated. In this alternative, oxygen gas would be injected in very slow flow rates, very low flow rates, into the groundwater. The others would be a little more of a quicker injection.

Okay. We again collected hundreds and hundreds of samples. We evaluated it. We looked at our alternatives on our focus list, and we compared those alternatives to these criteria. These criteria, basically the first one, "Overall Protection of Human Health and the Environment," answers: Does the remedy provide adequate protection, and are risks eliminated and reduced in the long term.

The second, "Compliance with Applicable or Relevant and Appropriate Requirements" that are applicable or relevant and appropriate requirements are basically standards. So the clean up standards for soil and for groundwater and this basically answers: Does the remedy achieve all clean up standards.

The next bullet, "Long-term Effectiveness and Permanence," does the remedy maintain reliable protection of human health over time even after the remedy is implemented. Is human health -- are there any risks to human health.